THE TEACHERS' BOOK OF CONSTRUCTIVE WORK

FOR ELEMENTARY SCHOOLS

ED. J. S. LAY

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ED. J. S. LAY, F.R.G.S

AUTHOR OF "THE PUPILS' CLASS-BOOKS OF GEOGRAPHY, HISTORY, ENGLISH COMPOSITION," ETC.

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TABLE OF CONTENTS

CHAPTER		PAGE
	Introduction	ix
I.	The General Principles	1
II.	Tableaux in Paper and Thin Cardboard	8
III.	History	16
IV.	Rapid Sketching with Pen and Ink	27
V.	Geography	38
VI.	Arithmetic	51
VII.	Nature Study	69
VIII.	Paper, Cardboard, Combined Cardboard and Wood, and Wood Modelling	81
IX.	Floor Modelling for Infants and Juniors	95
X.	Plastic Work	101
XI.	Needlework	105
XII.	Tools and Materials	134
XIII.	Time-Tables and Teachers' Qualifications	139

LIST OF ILLUSTRATIONS

PLATES		PAGE
I., II.	Tableaux in Paper	9, 11
III., IV.	Paper Cutting in History	17, 19
V., VI.	Cardboard Modelling in History	21, 23
VII., VIII.	Daily Sketching	28, 30
IX.	Objects Suitable for Rapid Sketching	32
X., XI.	Rapid Pen and Ink Sketching	35, 36
XII.–XIVa.	Paper Work in Geography	39, 40, 42, 43
XV.	Concrete Illustrations for Geography	45
XVI.	A Further Example of Paper Work in Geography	46
XVII.	Paper Pulp Modelling	48
XVIII.	Cardboard Modelling in Geography	49
XIX., XX.	Paper Work in Arithmetic	53, 55
XXI.	An Introduction to Paper Modelling	59
XXII., XXIII.	Mensuration and Arithmetic	61, 63

PLATES		PAGE
XXIV.	Paper Modelling in Arithmetic	65
XXV.	Passe Partout Framing	71
XXVI., XXVII.	Wood Work in Nature Study	75, 77
XXVIII.	Paper Modelling	84
XXIX.	Cardboard Modelling	87
XXX.	Combined Cardboard and Wood Modelling	89
XXXI., XXXIa.	Light Woodwork	91, 93
XXXII., XXXIII.	Floor Modelling	97, 99
XXXIV.–XXXVI.	Doll Dressing	107, 109, 111
XXXVII., XXXVIII.	Appliqué Work	115, 118
XXXIX., XL.	Needlework, Combined with Cardboard Modelling	121, 123
XLI.	Tools for Modelling	135

INTRODUCTION

It is becoming more and more evident that there is a persistent and steadily increasing demand for more practical work in connection with the teaching of the manifold subjects of the elementary school curriculum. It is now almost universally recognised that "constructiveness on the part of the child is of the essence of education, whether that constructiveness be applied to woodwork, to clay modelling, to English composition, or to the invention of problems in arithmetic."

A great number of books and articles have recently appeared in which the claims for the inclusion of manual work in the school time table have been more or less completely demonstrated; but with the exception of one or two books on special subjects, such as woodwork and cardboard work, there are very few really practical volumes dealing with handwork and its application. Most of the present publications treat of handwork as a separate additional subject in itself, only here and there indicating its connection with other portions of the curriculum; but it is mainly as a

method arising from and closely co-ordinated with the whole work, that handwork can ever take its proper place in the ordinary elementary school, as a means of supplementing and accenting the instruction given.

The aim of this book is to supply suggestions and illustrations of general handwork, applied as a means of teaching the ordinary school subjects. Both in town and country schools, there are considerable numbers of overworked and industrious teachers, who are anxious and willing to keep abreast of the times, who feel the real need for some radical changes in the methods of dealing with certain subjects; and it is hoped that such a book as this may be of some service in helping those whose time and circumstances do not permit of sufficient opportunity for searching for the necessary matter, advice, and material in all sorts of odd volumes.

It is not proposed to discuss at any length the physiological and psychological reasons for the new constructive movement; but it is absolutely essential that any teacher contemplating the inclusion of some of the many forms of manual work mentioned in this book must, at the outset, gather a fairly clear conception of its aims; and it is hoped that, without theorising, the first chapter will give the key to the whole book.

All the plates in this book have been produced from photographs of the real objects, all made by the children in one school, a mixed school bordering on the eastern suburbs of London, with an average attendance of 300 children. It is as well to realise that the exercises shown in the photographs have not been selected

from many schools, but have been entirely carried out in one school, under ordinary conditions; and from the plates it can easily be seen that a great many subjects are taught through, or the teaching of them supplemented by, handwork of some form or another.

The work described in this book is pre-eminently of a practical nature; only that amount of constructive work, which can fairly and reasonably be carried out in nearly all schools under ordinary conditions, has been included; and, although it is not claimed that the system is by any means perfect, it is believed that any teacher really desirous of making a good beginning in manual work will find much of real service, enabling him to frame and carry out a good constructive scheme, adequate and suitable for the varying needs of this or that particular type of school.

The book does not cover any of the ground already adequately dealt with in other books under such headings as Laundry-work, Woodwork, Gardening, etc.; in fact, no Centre work is dealt with, but there is included a fairly complete scheme of suitable handicraft work, applied to and allied with the teaching of Arithmetic, History, Geography, Drawing, Nature Study, Needlework, and Clay, Paper, Cardboard, Wood, and Floor Modelling, with suggested suitable exercises in most of the above-mentioned subjects, affording examples of handwork for every child from five to fourteen years of age.

Practical work of the kind included in this book is necessarily so closely correlated and interwoven with the various school subjects, that it is not possible, without much

unnecessary recapitulation, to give complete instructions for the carrying out of practical work under the heading of any particular subject; and teachers are advised to read generally the whole of the book, even though there may be no intention of including all the forms of work that are here set forth.

ED. J. S. LAY.

I

THE GENERAL PRINCIPLES

1. Continuity. The various forms of handwork indicated in this book are carried out in every class, beginning with the youngest child—this is probably the key of its success. The gap, which for so long existed between the Kindergarten work and the Centre work of the Upper Classes in the Senior School, has been successfully bridged over, by the introduction of suitable manual exercises in every class. By this means, a child, in passing from class to class, does not lose any manipulative skill; he leaves the Infants' School capable, for instance, of folding and cutting some little shape or object from the natural specimen. At the very outset he is taught to rely mainly on himself, in the choosing of colour, folding, cutting and pasting; there is little interference with the child's efforts; for imperfect work which is the child's own, has an educative value beyond any perfection attained by the assistance of others. The child, then, for two years continues more advanced work in paper, including simple measuring from the real object, with elementary exercises in reducing to scale, and he begins to make fairly accurate plans and sketches of the same. As in the first stage he learns to work independently of the teacher's help,

learning to fasten with paste in the most cleanly and skilful manner, elaborating his model with fanciful drawings and coloured papers, discovering by taking to pieces how other models are made and fastened, and from the outset frequently initiating new work for himself.

During the next two years cardboard work is carried out in a somewhat similar manner, but now glue is frequently introduced for the purpose of holding the model together, binding strips of paper and material are used, fancy papers are accurately measured, cut and pasted on the completed shape; more difficult scale drawing is introduced, and with the aid of compasses, set squares and protractors, plenty of manual exercises are included to enable the lad to use the various instruments with dexterity and ease. A very few tools are introduced to enable more substantial and lasting models of wood and cardboard to be made, and finally the scholar works mainly in wood, proceeding from what is officially described as "Light Woodwork" to the Manual Training Centre.

This, then, is a most important general principle which is carried out in dealing with every subject: every child in the school does handwork somewhat similar to that of every other child, in connection with geography, history, needlework, drawing, arithmetic, nature study, etc. There is no loss of effort, no loss of skill when a child passes from class to class; the work is carefully graded to suit the needs of the individual, so as to call for the maximum of individual effort, independent thought, and originality. From the first to the last stages, this main principle of continuity of work is followed throughout, with the same general scheme for the carrying on of the

work in every class. As little direct assistance as possible from the teacher is given. A spirit of happy helpfulness and general watchfulness is maintained, with no finishing touches to the completed work on the part of the teacher wrongly aiming for an ultra-finished and perfected object, which is not the child's very own. A certain amount of definite time must be given in every week for the purpose of training every child in producing entirely spontaneous and freely imagined work, or there can never be any quite original production with the oldest child. It is difficult and often well nigh impossible to get a boy or girl of twelve years of age to produce an original drawing, wood model, or clay design, unless he has been early trained to rely on his own resources.

2. The Two Kinds of Handwork. There are illustrated in this book two chief classes of handwork :—(1) The Free Work and (2) The Work Demanding Mechanical Accuracy. It is essential that both kinds of work should be attempted. In the lowest classes, there is naturally more free work than work demanding accuracy, but in all classes of scholars above seven years of age there should be at least some of both kinds, and it is necessary to include both in a carefully graduated course of lessons.

Of the free kind of work, there is, for instance :—

(*a*) The free cutting (without guide of any lines or shapes) from plain or coloured paper or cardboard of the various illustrations for the history and geography lessons, for the illustrations of poems and stories, for the setting up of imaginary tableaux.

(*b*) The exercises in clay and plasticine modelling.

(*c*) The free choosing and cutting of material for the dressing of dolls, in connection with various needlework and other lessons.

All these free exercises are carefully explained and dealt with under the various chapters. It is of the first importance in the earliest stages, viz. with children of five years, as well as with the older children, that blank paper should be used for all free paper exercises, as it is essential that the child should commence to cut and shape without any artificial guiding. In fact writing on blank paper for every child in the school has proved to be entirely satisfactory, and such exercises as drawing and modelling are found to benefit immensely by the system of never using any other than blank paper throughout the school for every kind of work, with the exception of "graphing."

Of the work demanding accuracy, there is

(*a*) The cutting in paper, card, and wood, of accurately ruled and measured shapes.

(*b*) The making of objects for illustration and use in connection with arithmetic, drawing, needlework, and other lessons.

(*c*) The making of models for object teaching for school and home use, or for any of the several lessons referred to later.

3. **Cost and Choice of Material.** An important consideration, which has had great influence on the choice of material for handwork, is the question of cost, and a

short chapter on this most important subject has been included. The objects illustrated in this book have all been made with the cheapest and simplest apparatus, because, in really free work, which is carried out entirely by the child, and in many instances at the child's initiative, there is bound to be some amount of waste material, and it is necessary in these days of economy to buy really cheap articles in order to give the child plenty of opportunity to exercise his skill and imagination. It is not until a child through rushing at the work, or through inaccurate drawing, has failed to produce a correct model, that he realises the meaning of accuracy and truth, and gradually becomes industrious, careful, and self-reliant.

Another important point also is, that it is better not to use elaborate tools and expensive material. It is most unlikely that the average budding citizen will have at home more than the few absolutely necessary tools for producing any of his own work, and there is a great deal to be gained by learning to work with odds and ends of materials, and with the simplest tools. There can be more real educational work in the object produced by a knife with a broken blade than by the most perfect set of carpentering tools. Where good material and expensive instruments are used, the worker is completely hedged round with rules, methods, and the *bête noir* of cost if the material should be spoiled; much valuable time is wasted in awaiting definite instructions as to procedure, and the work becomes a stiff, stilted, and mechanical exercise.

This, then, is a further governing principle which has been faithfully applied in producing the work illustrated in this book: the material throughout is cheap and

simple, and the tools, though good, are few in number. Liberty in choice of material is allowed the child (of course within reasonable bounds, governed largely by the personal ability of the teacher), and in all small matters, freedom as to methods of work and ways of finishing are permitted, for children are most ingenious in suggesting simpler methods.

4. Time Tables. The practice which has been followed throughout in formulating and materialising a scheme for this system of constructive work is simple and effective.

First Week—Manual exercises connected more especially with arithmetic and demanding the use of tools such as knives and scissors are carried out in each class.

Second Week—Manual work is used in connection with history.

Third Week—Plastic modelling is applied to nature study and geography.

Fourth Week—The more accurate and mechanical work of cardboard, paper or wood modelling, is done.

It is most important that a considerable variety of material and methods should be used, or the handwork loses a great part of its value. The materials which will be referred to in this book are clay and plasticine, paper, cardboard, cardboard and wood, needlework material, and paper pulp, besides odds and ends of various kinds. By arranging the work in some such way as this, it is easy to supply sufficient manual exercises in every week to keep the hands dexterous and skilful.

and not too much time is taken from the ordinary methods of teaching any of the above subjects.

It does not appear practicable to teach everything manually, as has been suggested; it is useless to drag in the manual exercises, regardless of their suitability or use; but, as will be clearly shown under the various chapters, many school subjects at present generally taught without any manual or practical aids can be much more educationally, and consequently more efficiently and satisfactorily dealt with, by the help of suitable hand worked exercises.

Group Teaching is carried out at every stage of constructive work, that is to say, all the children in a class mutually assist or aid in building up some general model, or some particular work in hand: this opportunity for co-operation and mutual help is a valuable side of school work, which is never lost sight of. A further note on time-table arrangements is included at the end of the book.

II.

TABLEAUX IN PAPER AND THIN CARDBOARD

PLATES I. AND II.

The little pictures shown in these two plates represent imaginary scenes, which can be readily made by the tiniest child of five years, or by the scholar shortly about to leave the Elementary School. They afford a most fascinating, interesting, and useful occupation in manual work, which can be correlated with a great number of school subjects at a minimum cost, while at the same time allowing a very wide scope for individual initiative and skilful work.

The children have first to form a mental picture of some scene, which will in the case of the youngest children illustrate a story recently told them. With other children it may be a story previously read, an imaginary scene of some foreign land, or a historical tale, described by the teacher in the ordinary course of oral lessons, or again, some scene imagined by the child, which will represent a verse of poetry or story for composition.

The child is then given two sheets of ordinary drawing paper, about eleven inches long by seven and a half inches wide One sheet of paper is folded in halves, and the

PLATE I.—Tableaux in Paper.

1. Jack and the Giant. 2 The sweep in "Oliver Twist." Imaginary pictures are cut freely from plain paper without guide lines, fastened to a painted ground with paste by little flaps left at the base. The figures are then painted, and, when not in use, lie down flat in an exercise book.

one half is coloured with crayon or water-colour to represent the sky of the intended picture, which may perhaps include a glorious Eastern sunset, an Aurora of the far North, or, in fact, any sky suitable for the subject in hand. The second half of the paper is coloured to represent the foreground and distance of the intended structure, according to the imaginary picture in the child's mind. Then with a pair of scissors the child freely cuts (*i.e.* without any drawings or lines) from the second sheet all the various people, animals, houses, and objects which are to be placed in the tableau, taking care in every instance to leave about *half an inch of extra paper at the bottom of each figure.* At the same time the child, according to his age and capacity, arranges the various sizes of the objects, so as, finally, to produce a picture with the more distant figures in something like perspective proportion. The little silhouettes are then coloured with crayon or water-colour, and are fastened down to the ground with paste (by the half inch of paper which was left on the base of the figures) in such positions as the child desires.

During the drying process all the little figures are laid down flat on the painted ground work, and the sky is folded on them. The ground is then pasted on the underside, and it can readily be stuck into an ordinary exercise book. It will now be seen that, when dry, the book can be opened, and the figures and sky straightened upright, and a most charming and delightful tableau is always to hand, affording endless pleasure to the producer. In practice it is found that about two half hour lessons are required to complete a picture in the way described above. During one of the lessons the figures are cut from the blank paper, and during perhaps a drawing

PLATE II.—Tableaux in Paper.

1. The Windmill. 2. Red Riding Hood. Imaginary pictures are cut freely from plain paper without guide lines, fastened to a painted ground with paste by little flaps left at the base. The figures are then painted, and, when not in use, lie down flat in an exercise book.

or painting lesson the figures are coloured and pasted down. If an exercise book be kept expressly for manual work of this and similar kinds, to be described later, the silhouettes can be safely enclosed in these till required. It is not necessary to distribute paste to the whole class; about ten paint palettes of paste distributed on the desks will be found ample for work of this kind, and little spills of twisted paper answer admirably for spreading the small quantity of gloy or thin paste required.

The little picture (No. 4, Plate XXIX.) has had the sky portion stuck on the inside of a cardboard box, and the figures have been cut from white card, the box having been first made and covered by the picture producer. By placing a few of the best models in boxes in this way, there is always a good set of pictures ready to hand as an object lesson and guide to future builders, and they further afford excellent copies for some drawing lessons. Owing to the colouring of the models, it is not possible by photographic methods to give an altogether adequate idea of the charm of these pictures, but it will be found that if the children really learn to cut freely in blank paper, and do the whole work themselves, they will rapidly become adept, cleanly, and clever in the use of such simple tools. The exercise can be used in a history lesson, as a change from oral work, to depict manually some historical episode, or again in geography, or in composition lessons to produce constructively a real object, which is often a capital means of proving how far the child has grasped the mental image or story which has been placed before him.

Whenever any pasting is to be done, it will be advisable to give every child two

pieces of paper—any used-up exercise paper will do—and to arrange that the child always lays on the one piece the object to be pasted, and keeps the other piece clean for pressing the pasted portion into position: this ensures that in a very few lessons the youngest child will work quite cleanly and easily. The teacher should rigidly refrain from doing anything more than suggesting and hinting to the child what should or should not be done. It will be found that the practice of cutting from the mass, snipping here and there to bring the figure into shape, will rapidly improve the child's ordinary drawing; and the choosing of paints and the colouring of the objects will have a marked effect on the painting lesson. Work of this kind, too, is of immense value because it brings the teacher into such intimate contact with the individual. It is, fortunately, impossible by this means to teach in the mass; and although a teacher may not be able to advise and talk with every child in each lesson, it is not difficult to arrange that a fair proportion of time shall be given to each scholar during the many manual lessons of different kinds. It is well to let the children freely talk, in moderate tones, during these lessons, for they are so intensely interested that discipline of the right kind is much improved; and children, through suggestions and example, aid one another in a way in which few teachers can ever hope to do.

In Infants' Schools teachers will find it advisable to have a few sheets of larger drawing paper for the skies and foregrounds, so that the children can work in groups to produce more extensive pictures, such as those illustrated in Plates V. and VI. These latter are made from cardboard, which is much too difficult for little fingers to

cut; the paper can be readily made to remain upright by pasting little paper props behind the figures.

Plasticine, or clay models, or objects produced in any other medium, can frequently be introduced into the large paper model, and so in a useful and pleasant manner, many varying manual exercises may be correlated (*vide* Plate XXXII.).

It will be observed that the making of tableaux such as have been described can be introduced as a method of teaching a considerable number of school subjects, as the making of tableaux is merely the carrying out, by handwork, of certain exercises which are now usually done either orally or in writing. On certain days, instead of writing a story, the necessary apparatus can be given out, and the story can be expressed by the child in a different language, *i.e.* by paper and colour; and the teacher will have many opportunities of finding out from individuals during the course of the lesson just how much the child has really grasped; and also how much it is capable of expressing in simple definite terms. It will be found that after a time the actual oral language of the child will become more definite, lucid, and free, under the influence of such manual training. Again, a geography lesson, or a history lesson can be similarly treated by the child making a picture representing the essential facts which have been imparted. The Indian and his wigwam, the Eskimo and his dog, Hiawatha and his hunting, live and breathe with new life to the child who fashions his own tableau.

If combined or group work is the order of the day, the watchful teacher will learn more of how much the children really understand in one combined lesson of

manual work than in many lessons of oral questioning, which, after all, to a great extent, often becomes a teacher's rather than a scholar's lesson. It is well to arrange at an early date what grouped work shall be undertaken, so that the children can prepare, in many lessons if need be, suitable objects made in clay, in wood, in needlework, to complete the preconceived tableau.

III.

HISTORY

PLATES III. TO VI.

PLATES III. to VI. give illustrations of free manual work, for use in connection with History Lessons. The various figures of weapons, dress, armour, etc., in Plates III. and IV. have been cut from thin coloured paper, which is usually listed in the kindergarten catalogues as pulp paper; the size sold in 8-inch packets, assorted, coloured, ungummed and unglazed, will be found both convenient and economical. The figures in the illustration have been cut from such paper, various coloured pieces being used for the different parts of the object to be illustrated, and superimposed (with paste) one on the other. In these illustrations, the little flat pictures produced have been mounted on cardboard for illustrative purposes; but the usual practice is to provide each child with an ordinary plain exercise book. This is roughly divided into several parts, by means of dating the top of the pages, according to the periods being studied, although it is as well to leave sufficient room for historical illustrations apart from any set syllabus.

Then some history lesson is treated manually; the objects are freely cut in

PLATE III.—Paper Cutting in History.

The little figures are cut freely from coloured paper and pasted in exercise books. Some of the figures are imaginary, and others are derived from books, objects, and illustrations. The work is suitable for all classes, demands skill and accuracy, and is interesting and valuable.

coloured paper from historical pictures in the various readers, from actual objects if attainable, from wall diagrams, or from the excellent sets of historical cards now on the market. Plain paper is not used, because it is not practicable constantly to use paints for all manual operations. The coloured and cut out objects are then pasted in the exercise book in some chronological order; and in a short time a most useful scrap-book is possessed by every child, who has manually produced, with care and thought, such illustrations as will make a lasting impression on the child's mind. The operation calls for considerable skill and ingenuity, especially as at least all the simpler forms are cut freely with scissors, no pencil or guide lines being permitted, the children learning at the commencement to balance in the mass. There is plenty of room for individualism; and the work can be as readily done in the lowest as in the highest class, the work of the former being, of course, exceedingly simple. By its use the memory is strengthened, and the difficulty of approximating dates is considerably lessened. The manual work goes a long way to popularise the subject. This is a great step gained If the interest of the child be caught, it is not difficult to catch his intelligence. Of course it is not suggested that history is taught by this method alone, nor does it displace the ordinary lesson; but it does, in a marked degree, assist in teaching facts; it clothes the dry bones with a gaudy dress, and makes the after-work much more easy; and what is more, it affords an opportunity for the display of considerable manual dexterity and ingenuity. It requires much practice to cut and paste in the exercise book some of the complicated designs of dress, armour, and houses which illustrate certain periods of history. As may be

PLATE IV.—Paper Cutting in History.

The little figures are cut freely from coloured paper and pasted in exercise books. Some of the figures are imaginary, and others are derived from books, objects, and illustrations. The work is suitable for all classes, demands skill and accuracy, and is interesting and valuable.

observed from the Plates, the illustrations are of two kinds, those copied from various sources, and those which are purely imaginary in character, and which merely serve to impress a fact, in conjunction with affording an exercise in manual skill.

Plates III. and IV. contain illustrations, both copied and fanciful, of various historical events. An ingenious cutting of a man's ear pasted on to a cut out map of Spain is a memento of the War of Jenkins' Ear; the apple is associated with Isaac Newton; and the bubble and the pipe with the South Sea Bubble. The children are keenly interested in making these imaginary illustrations; and very startling are some of the designs. Of course the illustrations could be done by sketching only; but then the manual exercise would be of much less value; and sketching can be utilised in another lesson, as a test of the strength of the mental impression retained, or as an illustration in an ordinary writing lesson. To those who care to make a trial of treating some of the history lessons in this manner, a careful study of the Plates will be found both interesting and suggestive. Plates V. and VI. are samples of work connected with history teaching, which afford excellent opportunity for the children to work in groups. It cannot be too frequently emphasised how important it is that children should very frequently co-operate in work for a common end; it gives a training in moderation, restraint, mutual helpfulness and politeness, which cannot but work for the lasting benefit of the individual scholars.

These cardboard models are made in exactly the same manner as the little tableaux described in the first chapter. Medium white cardboard is first cut out with knives and scissors by six or eight or more children working together, arranging

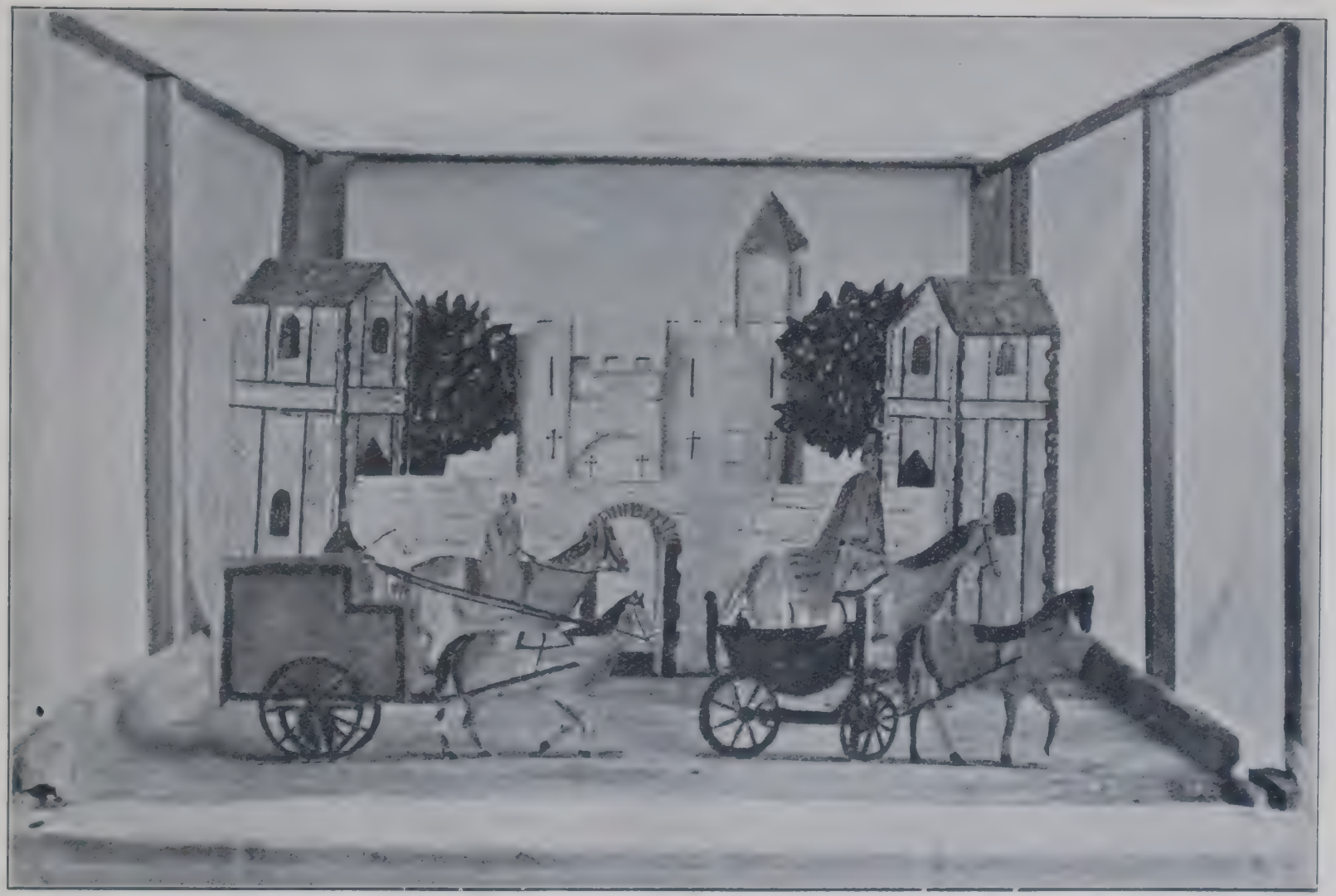


PLATE V.—Cardboard Modelling in History.

The children work in groups, and build up a historical scene or set of figures from cardboard. The figures are painted and propped upright with wooden sticks stuck into holes in the wooden base. The whole is surrounded by coarse muslin fastened to little wooden posts.

among themselves what the scene shall be, and how represented, the teacher maintaining, as far as reasonable, a position of neutrality. About one inch of extra card is left on the base of each figure, or set of figures; and after a foreground has been painted on needlework cutting-out paper (large, thin, unlined, cheap sheets), the models are fastened down by the margin which was left, being bent at right angles, and stuck with glue. Small pieces of wood, and small brads are used to prop the larger shapes. The sky is generally painted on similar paper to that used for the foreground; and the whole is surrounded with muslin, stretched on wooden supports, fixed by the children. The wooden base can readily be made, by both older boys and girls, who are provided with the simple and cheap tools mentioned under Plate XLI. Here then is a really live work, affording scope for endless skill, individual and collective effort, something on which to tack many future lessons, something that makes the history a living subject, and something readily taken down and replaced by another set of models and pictures, when necessary and advisable.

Plate VI. indicates a somewhat similar, though a more difficult, historical illustration to execute. Here the buildings are cut from the flat card, but in such a manner as to form houses and churches when bent into shape, and glued down with flaps left for that purpose. A wooden paling has been built round the group; farthing dolls have been dressed to represent the characters; and needlework has adorned the curtain in the doorway. Even though it may not be proposed to take any form of woodwork in a school, it is well to provide every class with a glue-pot, two or three riveter's hammers, a small tenon saw or two, pincers and three-quarter-

PLATE VI.—Cardboard Modelling in History.

The children work in groups, and build up a historical scene or set of figures from cardboard. The figures are painted and propped upright with wooden sticks stuck into holes in the wooden base. The whole is surrounded by coarse muslin fastened to little wooden posts.

inch brads. The groups of children, whether boys or girls, rapidly become efficient in putting the tools to simple use; and with all kinds of manual work small strips of wood and glue are constantly in requisition, One of the most suitable woods for these larger models is bass wood of about $\frac{1}{2}'' \times \frac{1}{8}''$ and $1'' \times \frac{1}{8}''$ and $1'' \times 1''$ planed smooth; all sorts of odds and ends of wood can, of course, be utilised if desired.

The same precautions should be observed in pasting down the illustrations for the historical scrap book as were mentioned under tableaux in paper. Two pieces of paper should be supplied to every scholar, one piece to paste on, with a spill of paper or a cheap camel-hair brush, and one piece to press the cutting into position; the books can then be kept tidy and clean. Children can be encouraged to bring cigarette pictures and post cards, further to adorn the book, and these can be bound flat on the page with gummed strips of paper, mitred at the edges, if it is required to afford further manual work. In fact, there is a very wide field for the making of historical illustrations, affording endless variety of useful and good manual work.

The method usually adopted for procuring suitable illustrations for younger children to reproduce in paper, is to arrange for the older scholars to draw with chalk and crayon, on large sheets of stiff paper (brown paper will do), large simple figures of suitable objects, shields, spears, swords, helmets, dwellings, etc., and figures of the various individuals around whom the stories are woven. These are then hung on a lath suspended from the picture rail, or put away till required. By some such method as this being adopted, suitable illustrations are always available; the teacher's

time is saved, and it is an excellent plan to let the older children prepare illustrations and objects for their younger friends whenever reasonable, for by so doing a spirit of comradeship and helpfulness is fostered throughout the school. The cardboard and miscellaneous apparatus, which are sometimes made for the dramatisation of historical episodes, are not referred to beyond this note; because one of the chief aims of this book is to provide for continuous handwork throughout the school, and it has not been found quite practicable to dramatise history in the upper classes, except on rare occasions, owing to the time for the teaching of the subject being so limited.

It has already been suggested how doll dressing can be utilised for the purpose of illustrating history in a practical manner, and this subject is again referred to later. When possible, such other mediums as clay, plasticine, and raffia grass should be utilised for the making of models, to elaborate still further some of the larger historical tableaux.

For instance, it might be decided to prepare a model of the Landing of the Romans. During a geography lesson some children could, with clay or paper pulp, fashion the cliffs of Dover, and others paint the sea on thin paper; while the remainder of the class are engaged in clay modelling on a smaller scale in connection with the same subject. In the following needlework lesson, tiny dolls could be dressed to represent Romans and Britons, or in boys' schools the figures might be fashioned in cardboard or plasticine. In the drawing lesson the wooden palings, the cardboard or paper huts, the various tiny weapons, the Roman vessels, etc., could be made; and in another lesson all the objects could be combined into a large, pleasing,

and instructive model. In some such way as this the handwork of many lessons is readily combined with the various subjects; geography and history are closely associated; the children look forward with keen pleasure to the completion of the model, and instead of time being lost through the ample manual work provided, the various lessons in which it has been taken have been much strengthened by its incorporation.

IV.

RAPID SKETCHING WITH PEN AND INK

PLATES VII. TO XI.

ALTHOUGH there is no intention of including in this book the subjects of drawing and painting, manual subjects already so adequately dealt with in many books, it is perhaps advisable to bring into some little prominence the subject of rapid free sketching with the pen, because a considerable amount of use is made of the pen in completing and finishing off many of the objects in other manual exercises. The pen is often the sole instrument of the child, generally quite ready to hand, and it has been found that certain special training with this facile instrument amply repays the constant attention and care bestowed on teaching its use for purposes other than ordinary writing. Every child, from seven years of age, draws with a pen from a natural object for ten minutes every morning; the time so given can easily be sandwiched between some such lessons as Scripture and arithmetic, when a distinct break in the work is necessary and advisable. The work is done direct from a natural specimen, as often as possible a specimen brought by the child, and placed on the desk in front of him, and then rapidly sketched in pen and ink into a small unlined

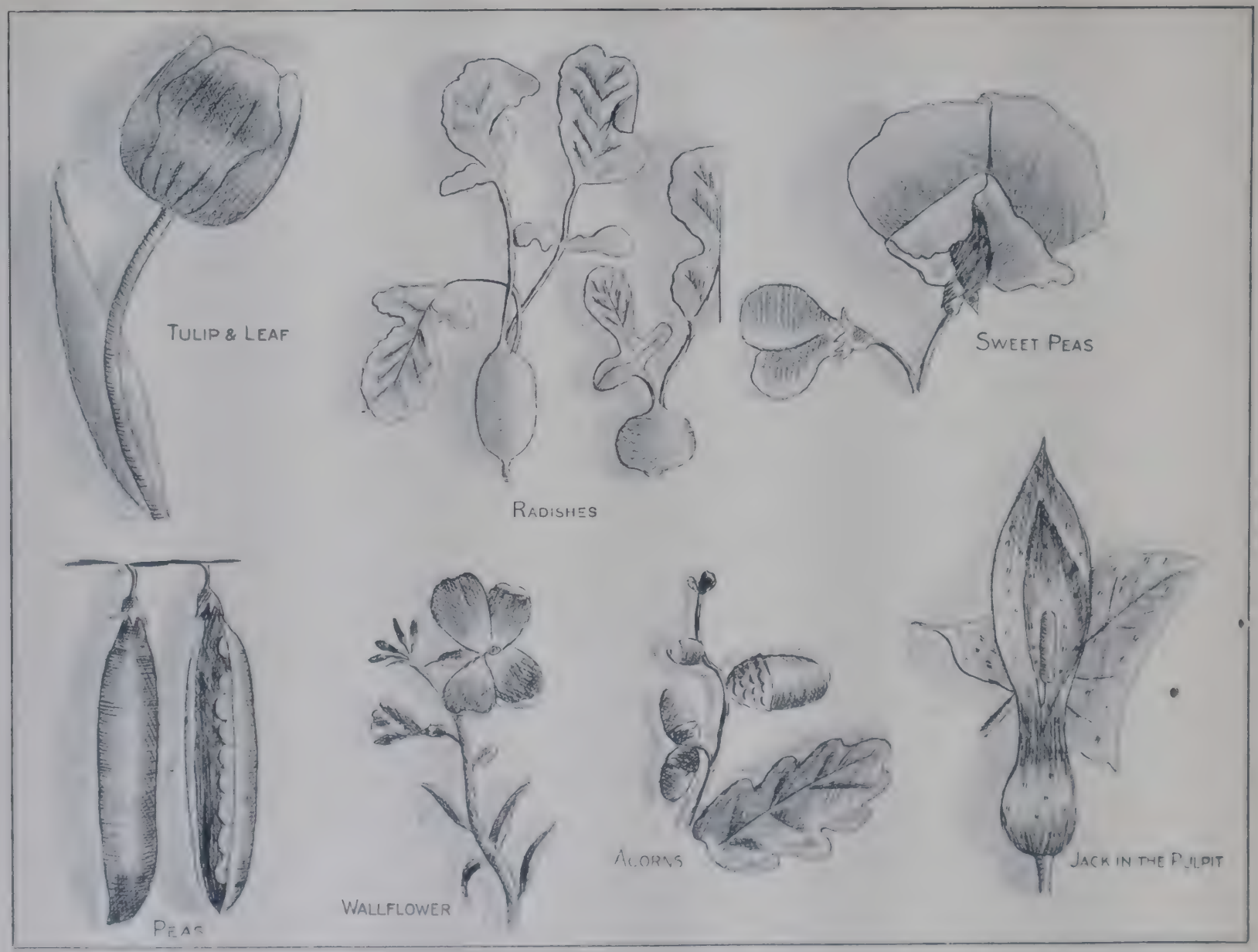


PLATE VII.—Daily Sketching.

The children in every class sketch from objects directly with the pen for ten minutes every day. The specimens are brought by the scholars when possible, and the sketches are kept in a plain note-book.

book. Where it is possible, simple specimens from nature can be brought for about six months of the year; and during the other months a collection of thirty or forty objects, gathered together from all sources, is kept in each room, and, as only one object is required between two scholars, such a collection affords a very large amount of practice for every child. Even in the earliest years some attempt is made to produce the fullest possible representations of light and shade. It is almost incredible how quickly children become proficient in rapidly drawing with reasonable correctness all kinds of natural specimens. It is not necessary, in a short ten minutes' lesson, carefully to grade the objects, although naturally the easiest will be given to the youngest; nor is it reasonable to expect complete accuracy, though always, of course, improvement in the quality of the work must be demanded. The child must learn to draw what he really sees: there is no time for the teacher to indicate what should be done. The child must get into the habit of going straight at the work without fear or trepidation, in the full knowledge that every line will remain for ever. This constant daily practice produces in the child a marvellous power of keen and accurate observation, a wonderful quickness and lightness of touch, and that confidence in the use of the pen which is so much to be desired.

It is well to have the name of the object carefully printed under the drawing, so as to afford a little daily practice in varying kinds of printing; and it is found that with this constant daily pen and ink work there is no difficulty whatever in getting the pupils to sketch for illustrative purposes during any lesson. It is hardly reasonable to expect a child to produce a story, a mental picture, by means of a pen sketch,

PLATE VIII.—Daily Sketching.

The children in every class sketch from objects directly with the pen for ten minutes every day. A collection of specimens similar to those illustrated is kept in every room for use when natural objects are scarce.

unless he has some regular practice in keenly observing and recording his observation. It is a useful change to let a child sit or stand in front of the class as a model for rapid sketching of this kind, and the errors which so frequently appear in ordinary pen and ink sketches will, at least to some extent, disappear. Plates VII. and VIII. are illustrations of the kind of work which ordinary girls and boys of from eleven to twelve years of age can readily do in ten minutes; and Plate IX. gives a set of the little objects suitable for sketching, which have been gathered together from various sources. The books for the sketches are regularly given out before school commences, and on entering the room the children produce their specimens, or are handed others from the collection to choose from, so that there is no waste of time in preparing for the work. A good and difficult sketch will sometimes require longer to complete, but there are always odd minutes, during marking of registers, for instance, and other times, when the children will complete their sketch. There has never been found any difficulty in getting the work completed without detriment to any other subject; in fact, the pen work is always so popular that there is a general anxiety to do the work at any cost of time or trouble. This training leads to the use to which pen drawing can be applied for the rapid illustration of other lessons. Plates X. and XI. give examples of direct pen sketches, drawn by children of between eleven and twelve years of age, representing imaginary scenes of one kind or another. As in the case of the paper tableaux, the mental picture is first formed, and then an imaginative sketch is produced to illustrate the same.

The development of the power of imagination is of great importance, "that power

PLATE IX.—Objects suitable for Rapid Sketching

All kinds of odd specimens are brought by the children for the daily ten minutes' sketching.

which takes us out of our immediate material environment, reveals a new world of thought and feeling, and gives a new outlook on life. Properly directed it brings out all the noble qualities of nature, strengthens the character, and adds charm to the existence." Poetry, with its wealth of imagination, is an excellent subject for illustration with the pen ; but, of course, it is very necessary not to kill the poetry by demanding in any way a certain set line of action in the illustrating. Give the children free play ; always encourage honest effort, and endeavour to find something good in every attempt. A child's attention is more closely chained when he is *actively* engaged in learning. It cannot be too frequently emphasised that "learning by doing is not drudgery." No opportunity should be omitted of allowing the resourcefulness of the child to come into play as regards methods; do not, for instance, teach how a tree should be represented ; encourage a child to observe direct from nature, and, if possible, to bring a sketch of what he thought he saw. One of the real objects of education is to instil the greatest number of generous and fruitful ideas; the teacher's part is that of guide and director. There should, however, be no slavish desire to illustrate at all costs ; it is sometimes absurd for children to attempt to illustrate good literature ; the best thoughts cannot always be committed to a simple drawing.

This daily ten minutes' drawing from a natural specimen with pen and ink is, then, carried out in every class ; and in every case some attempt is made to represent, as far as the child is able to observe, as much of the light and shade and texture as possible. It will be seen how closely this handwork of daily sketching is intimately

bound up with nature study. Every morning the children look about for specimens of plants, leaves, flowers, and geological or other objects, their names must be discovered from the teacher or from the reference books always available, and a few minutes' conversation about some of the specimens is generally fitted in at some period of the day. Thus, then, the children have a wonderful little record, all kept in a separate book, of the various natural specimens carefully illustrated daily by the pen, from which nature and other calendars can occasionally be abstracted. Of course there are plenty of other opportunities provided for those kinds of drawing which demand much bigger muscular movements, so that the balance shall be kept, or the drawings would degenerate into small, meagre representations; but, generally speaking, there does not appear to be nearly sufficient use made of the ordinary pen, which, after all, is usually the instrument most ready to hand, both in and out of school; and a child who can represent his ideas with a sketch to some extent loses much of the vagueness and ambiguity which otherwise frequently characterise his written and oral work.

It is an excellent plan occasionally to ask the class to illustrate with the pen, say, six events in history. It will be found that when manual work is done, as in the chapter under "History," and where the value of the pen in drawing is taught, the children can readily represent these facts asked for, generally showing a most intimate acquaintance with, at least, the salient features; and it is then much more easy to weave around these well-known facts the proper kind of history which is to be imparted.

Hail! to thee blithe spirit
By twenty thorps, a little town,
And half a hundred bridges.
And busy housewife ply her evening
Under the spreading chestnut tree
The village smithy stands.

PLATE X.--Rapid Pen and Ink Sketching.

Pen and ink sketches are frequently done in all classes for purposes of illustration. The daily sketching from objects trains the children to illustrate freely and boldly with pen and ink. The sketches are often purely imaginary.

PLATE XI.—Rapid Pen and Ink Sketching.

Pen and ink sketches are frequently done in all classes for purposes of illustration. The daily sketching from objects trains the children to illustrate freely and boldly with pen and ink. The sketches are often purely imaginary.

Geography questions can, of course, be treated in a manner similar to that suggested for history, and, in fact, as a rapid method of testing accuracy of knowledge, there is nothing to equal the pen sketching, provided always that word sketching is not excluded, or pressed out. The note books kept by all the older scholars for needlework, gardening, and Centre work, are, naturally, frequently illustrated without any expressed wish of the teacher, who is then in a position still further to judge of the child's accuracy of impression.

V.

GEOGRAPHY

PLATES XII. TO XVIII.

THERE is, probably, no subject of the school curriculum which has made greater strides in the modern methods of teaching than geography; and to-day there is much real practical work carried out in connection with this subject. The almost national introduction of the subject of nature study has led to its right and intimate connection with geography, and, as it is not possible to alienate the two, a good deal of practical geography has necessarily been included under the title nature study.

Plates XII. to XIV. give some idea of what can be done with simple paper cutting, in exactly the same manner as that described under history. The children of all ages are presented with ordinary blank drawing paper, scissors and paints, and here and there about the class is placed a little gloy. It is, of course, understood that the geography has been properly taught by any of the modern methods now so well known; but the time must arrive when the teacher feels that something concrete and tangible will help matters along; and then, with the aid of the above apparatus, the children all cut out in blank paper a map of some country. This is fastened with

PLATE XII. —Paper Work in Geography.

The little pictures are cut freely from large sheets of paper and afterwards are coloured and pasted on cards by children working in groups. The cards are hung in the room for future reference, and are particularly valuable in the lower classes.

PLATE XIII. Paper Wørk in Geography.

The little pictures are cut freely from large sheets of paper and afterwards are coloured and pasted on cards by children working in groups. These cards are hung up for constant use for future reference, and are particularly valuable in the lower classes

paste on the page of a blank book (perhaps a part of the manual book can be reserved specially for geography); and then the products, say, of a country can be cut out and pasted around the map. In no way can these facts be better fixed in the mind than through the muscular movements of doing something. The pictures can be cut from objects, memory, imagination, or from some illustrated book or picture, according to the age and capability of the child. This learning by doing will be found to give to the work, even of the most lazy and dull, a new zest and pleasure, which must be seen to be believed; and again, the manual operations call for skill and judgment in execution; the work can be allied with the painting lesson, as well as with the geography lesson. It is found, as a rule, that it is more practical, in dealing with a large class, to have all the cutting done in one lesson, and the colouring in another. Then, again, these scrap books afford such excellent opportunities for rapid recapitulation of the work; the child loves to turn over the gaudy pages and discover their charm afresh, and learn something more of their significance. After having once, by manual work, produced these illustrations, ordinary map sketching will be found very much easier, and it is a good plan to test the memory, at some future time, by asking for a series of rapid pen sketches, either at the end of an ordinary writing lesson, or for illustrating the written geography tests, or by sketches alone, without any writing, particularly in the case of tiny children. Children crave to do something, the eager way in which they bring suitable pictures for copying or pasting in the book, and the anxiety with which every school reader is searched for illustrations, when no objects can be procured, are indications of the love of working with the hands.

PLATE XIV.—Paper Work in Geography.

The little pictures are cut freely from plain paper without guide lines, and are afterwards coloured and pasted in books. The exercise is a valuable aid to the teaching of the human side of geography, demands skill, accuracy, and keen observation, and is particularly interesting.

PLATE XIVA.—Paper Work in Geography.

The little pictures are cut freely from plain paper without guide lines, and are afterwards coloured and pasted in books. The exercise is a valuable aid to the teaching of the human side of geography, demands skill, accuracy, and keen observation, and is particularly interesting.

The Plates XII. to XIVA. hardly need any comments; the little pictures consist of cuttings from blank paper, coloured and pasted on a card. Plates XIV. and XIVA. indicate some of the chief products and characteristics of Japan, Italy, India, and Spain, merely suggestive of what a wide field of work is here open to every little geographer. Plate XII. shows the animals of the Frigid Zone, and Plate XIII. the races of the Torrid Zone. This latter set of pictures is suggestive of some illustrations most appropriate for younger children to cut out and paste in their books, and the constant practice of this free work of cutting from blank paper will be found to improve the child's sense of proportion, accuracy, and judgment in a marked manner.

Plate XV. is an illustration of an old but favourite method of illustrating geography. Young children delight in doing something and collecting objects. The various products and manufactures of a country are gathered by the children from all sources, the map is cut out of a large sheet of paper by many willing hands (in the case of large maps an outline is first necessary), and then the glue pot again comes into requisition; and from day to day, as the lessons proceed, the map gradually becomes filled with a multitude of real things, until dust and use clamour for its cremation, and another map of some other country, or of a different nature, is made. Here then, again, is the opportunity for group teaching, with the intimate talks and conversations between the child and the teacher, and the creation of the spirit of good fellowship desired above all.

Plate XVI. is a somewhat similar example of the work, showing how the trade

PLATE XV.—Concrete Illustrations for Geography.

Specimens of the products, manufactures, etc., of a country are brought by the children and stuck with glue or seccotine on to a large map. This method is particularly helpful when teaching facts to young children.

PLATE XVI.—A further Example of Paper Work in Geography.

The plate is an illustration of group teaching. Pictures of the various products are freely produced and stuck on to a large map; trade routes are similarly treated.

routes can be cut from card or paper, and how the various ships indicating the chief cargoes can be placed in position ; the work is enjoyable, and very real. Plate XVII. shows a map made from paper pulp. Clay can, of course, be used, but paper pulp is a most satisfactory medium to use, particularly for children working on large models. Old newspapers are torn into tiny scraps, and left in a pail of water for a day or two, with an occasional stir. The pulpy mass is quite cleanly to use, and the water is just squeezed from a handful and shaped on a large board or cardboard base ; the smaller the pieces of paper the better will the pulp cohere. When dry, or nearly so, the pulp can readily be painted with water-colours or aniline dyes. The Plate is an illustration of young children's early efforts in practical geography, the land consists of the paper pulp above described, the tree trunks of wooden sticks, the branches of cardboard, the various animals, figures, houses, and the bridge of thin cardboard and paper, the running stream of shining white paper. The constant interchange of talk between the scholars themselves, and between the scholars and teacher, helps to eradicate the wrong impressions that young children so readily form in learning geography. The hammer, saw, glue pot, and brads are brought into requisition, for fastening firmly the various objects, and fixing the rebate round the board to keep the pulp in position ; a sheet of thin paper is sufficient to make a temporary cover, until interest is lost, and a new model is demanded. The pulp model referred to is on a small disused blackboard, about four feet square.

In Plate XVIII. is represented a large cardboard model of the Castle of Chillon, which has been produced in a manner exactly similar to that shown and described

PLATE XVII.—Paper Pulp Modelling.

Early teaching in geography can be splendidly illustrated by children working in groups and modelling on a large board with paper pulp. Newspapers are torn into tiny pieces and soaked for a few days. The pulp can be readily painted, and wood, cardboard, and paper figures can be stuck in it.

PLATE XVIII.—Cardboard Modelling in Geography.

Large models in cardboard can be occasionally made by groups of children. The white cardboard is painted and the figures are propped upright with sticks and nails. The whole can be surrounded with muslin stretched on laths.

under Plates V. and VI. for the illustration of history. Sheets of thin cardboard are fashioned with knives and scissors into the various shapes of mountains, trees, boats, etc., with about one inch of spare card left at the base; this spare piece is afterwards bent at right angles, to act as a support, in conjunction with a few wooden posts fixed behind the card with glue and brads. The cardboard is painted in broad masses, by several children working together; the foreground and sky consist of thin cheap paper, coloured as required, and the whole group of models is placed on a board, and surrounded with stakes and muslin as before described.

Apart, then, from such obvious practical exercises as using the scale, planning maps, measuring and drawing plans, using the chain and land measures, and the practical outdoor work, more generally described under nature study, it will be seen that a great deal of regular, useful, and excellent constructive work can be done, in connection with the important subject of geography. The dressing of dolls for geographical scenes, and plasticine and clay work, are dealt with in due course.

VI.

ARITHMETIC

PLATES XIX. TO XXIV.

The handwork so far described has been of the order which, for the want of a better title, is designated "Free," insomuch as it has nearly all been carried out according to the judgment of the individual, without any ruling or measuring. But it is of the first importance that, at a fairly early stage, the child must begin to exercise all his skill and care in doing work which, in the later stages at least, shall be as accurate and correct as it is possible for it to be. There is, naturally, a certain amount of arithmetical calculation connected with the teaching of geography. For instance, children should frequently measure with compasses, or with dividers and rulers, the distances between places on maps and atlases, and calculate from the scale the actual distances. Mental and written exercises can be given on the time taken to travel a certain journey at a given rate; the cost of travelling at so much per mile; the difference in time, according to the longitude of the place, compared with Greenwich mean time; and many other practical geography questions all closely bound up with arithmetic can be set. The actual measuring of the rooms, play-

grounds, and, if possible, of adjoining fields with the land chain, should always be practically carried out; and then plans, either simply drawn or, as suggested in Plate XXII., manual exercises involving cutting in paper, can be employed; in fact, there is hardly a subject of the school curriculum which is not frequently used for practical purposes in connection with arithmetic.

There is, besides, a good deal of more direct work, which can be accomplished in connection with arithmetic; work closely correlated, however, in some instances with some of the stages of paper modelling, and the description of the one necessarily applies to the other. Plate XIX. gives suggestive exercises in paper for children of from seven to nine years of age. At this stage, the simplest form of ruler should be used; one containing inches, half inches, and quarter inches is ample for the work, and preferably a ruler without any figures should be used, so that the child can learn to count the inches, and avoid commencing with the first inch, where the ruler is frequently broken or chipped. Pieces of coloured kindergarten or pulp paper, scissors, pencils, rulers, and a small quantity of paste (the latter distributed about the desks), will be all that is required, with the addition that compasses should be borrowed from a neighbouring class when necessary. There is no reason why quite young children should not early learn the value of compasses; when they have become slightly familiar with them, there is no more danger in using them than in using a needle for sewing, or a pen for writing, and it is a mistake to restrict any exercise simply because it may not be usual to have other instruments for drawing.

PLATE XIX.—Paper Work in Arithmetic.

The plate illustrates exercises suitable for the lowest classes. The children are early taught to measure from actual objects and to cut out the ruled shapes in coloured paper; the shapes are then pasted in the arithmetic books for future written exercises. This concrete method of teaching keeps the hands skilful and impresses the facts.

A great deal of arithmetic is now being taught with concrete illustrations, and in a much more practical manner than has hitherto been the case; but there is a tendency to restrict the practical work to the various manipulations of measuring, numbering and lettering "lines." These exercises do not convey very much to the child; and, if it is in any way possible, real objects should be measured from the earliest stages, even though it may be necessary to ignore the odd fractions of inches. Again, the work should be as far as possible constructive, that is, paper, card, wood and clay should be actually used in connection with the arithmetical exercises; for it is by so doing that the fingers become skilful to continue constructive work in other lessons.

On Plate XIX. are shown, among other illustrations, exercises on the relative sizes of coins. The circles are drawn with the compasses and the little discs cut out from variously coloured papers.

In connection with early teaching of money value, this affords a good and useful manual exercise, and the paper silhouettes can be pasted in the arithmetic book, ready for reference at any future date. The ink-well, and the plan of a straw hat, are drawn with compasses, and cut out in a similar manner, ready for the numerous practical exercises in testing roughly the rule that the circumference is three times the diameter. Other exercises will prove the number of revolutions made by a wheel or hoop in going a certain distance; with a right-angled piece of cut-out paper, the angles in circles and triangles can be found by trial; and many other suitable exercises graded for children of different ages can readily be framed on the circle.

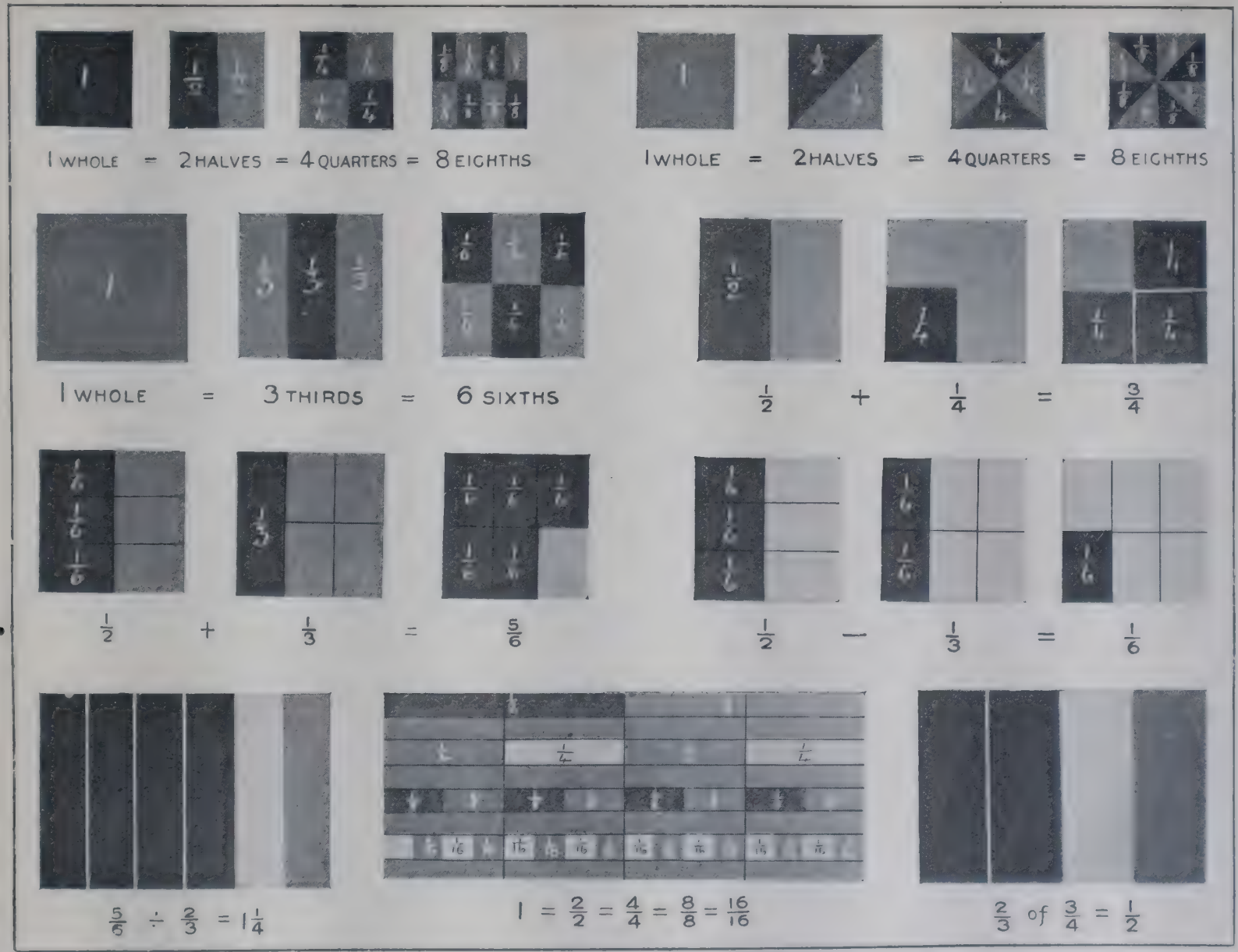

1 WHOLE = 2 HALVES = 4 QUARTERS = 8 EIGHTHS
1 WHOLE = 2 HALVES = 4 QUARTERS = 8 EIGHTHS
1 WHOLE = 3 THIRDS = 6 SIXTHS
1/2 + 1/4 = 3/4
1/2 + 1/3 = 5/6
1/2 − 1/3 = 1/6
5/5 ÷ 2/3 = 1 1/4
1 = 2/2 = 4/4 = 8/8 = 16/16
2/3 of 3/4 = 1/2

PLATE XX.—Paper Work in Arithmetic.

The plate illustrates the use of accurately ruling, cutting, and superimposing coloured shapes for the teaching of fractions. The shapes are pasted in the arithmetic books for future oral and written exercises. This concrete method of teaching keeps the hands skilful and impresses the facts.

Measurements can be made of the sizes of the quarter-pound, the half-pound, and one-pound weights ; the children can, from these measurements, cut out (as accurately as can be expected in the initial stages of ruler work) silhouettes of the same ; and they will be much more impressed with this concrete evidence of doing something themselves than by the mere illustration before the class.

The same idea can be utilised with regard to pints, quarts, and gallons. Strips of paper one inch wide can be cut of varying lengths, say six inches, five inches, four inches, etc., so as to familiarise the class, in a practical manner, with length and breadth. At quite an early stage the children must be introduced to simple scale drawing and simple fractions, because it is always more satisfactory to measure from real objects rather than from the teacher's directions. Every child can cut a silhouette of his or her neighbour, and then, with the tape-measure, actually measure the height, waist, neck, etc.; the paper can be cut one-eighth the size, if thought desirable. In connection with this exercise, girls can cut paper patterns for clothes, or reduced sizes for dolls' clothes. Each child should measure a book, halve or quarter the measurements, and then, with ruler and scissors (and as soon as possible with a set square), draw and cut out a plan. Plenty of further exercises can be introduced here, such as finding the perimeter, the length of the diagonals, and later on, the number of square inches contained in the plan. The pictures on the walls, the blackboards, desk tops, and cupboard doors, can all be treated in the same way. In practice it is found advisable in the early stages for children to use rulers for measuring quite frequently, as it takes a considerable time before any degree of accuracy can be assured ; and all

the future work in paper, and cardboard, and wood modelling, is entirely dependent on accurate measurement. A plan of the room, with the lines of desks, cupboard, and fireplace can be measured, at first roughly in steps, each step counting, say, half-an-inch. The room can next be measured in feet with tape measures, or with the map pole suitably marked, and plans can be cut out to a scale of one inch to a foot. An abundance of questioning dealing with easy numbers, easy measurements, and fractions, can thus be introduced practically at the earliest stages; and sums can be included and written beside the paper diagrams, in addition to, or apart from the purely mental work.

Plate XXI. is a suggested introduction to paper modelling; but is, in fact, exactly the same kind of work as that referred to above. Coloured papers are used, and all measurements are taken from the real thing, necessarily reduced to straight lines, but really very practical: fractions of inches must be ignored in some of these exercises, but with no particular loss to the individual. The plate itself is sufficiently explanatory; the objects selected for representation are naturally only suggestive; some demand considerable skill and accuracy in using the ruler and set square; but it is better for all to work from something real, even in the earliest stages, rather than to do mechanical drawing exercises which are purely theoretical. It takes a little time for a child to familiarise himself with the use of more than one drawing instrument; but the foundation of good, careful work must be laid when a child is young, when the necessary recapitulation has much less effect on him, than when he reaches the age of ten or eleven years. It has already several times been mentioned that two pieces of

paper should be used when pasting: one piece to paste on, and one piece to press the object into position; without this precaution, the desks, books, and fingers soon become most uncleanly.

Plate XX. indicates the value to which accurate paper cutting and pasting in a book can be put, when teaching fractions. It is well known to the practical teacher that all kinds of devices have to be attempted, in order adequately to bring home to the young minds the true meaning of fractions; and this illustration will offer further suggestions. After having been first carefully drawn, the separate parts are accurately cut in differently coloured papers, by means of set squares, rulers, and scissors; and then the slips are carefully superimposed on each other with paste. The diagrams are in themselves sufficiently explanatory; they can be much further elaborated, and, if it is thought advisable, the fraction chart in the centre at the bottom of the plate can be made a great deal more comprehensive. After a few constructive exercises of this kind have been manually carried out, the children readily grasp the general principles underlying the whole question of fractions, and a series of exercises in decimals can be framed, side by side, in a somewhat similar manner.

In Plate XXIII. are examples of work done by children of the middle and upper classes. The examples are suggestive of a further number of constructive exercises which can be carried out in connection with arithmetic. The first, demanding some care and accuracy, is a proof of the rule that the angles in a triangle are equal to two right angles; the second is a suitable exercise in mensuration for questions dealing with length, breadth, and area. These figures, with most of the others on this page,

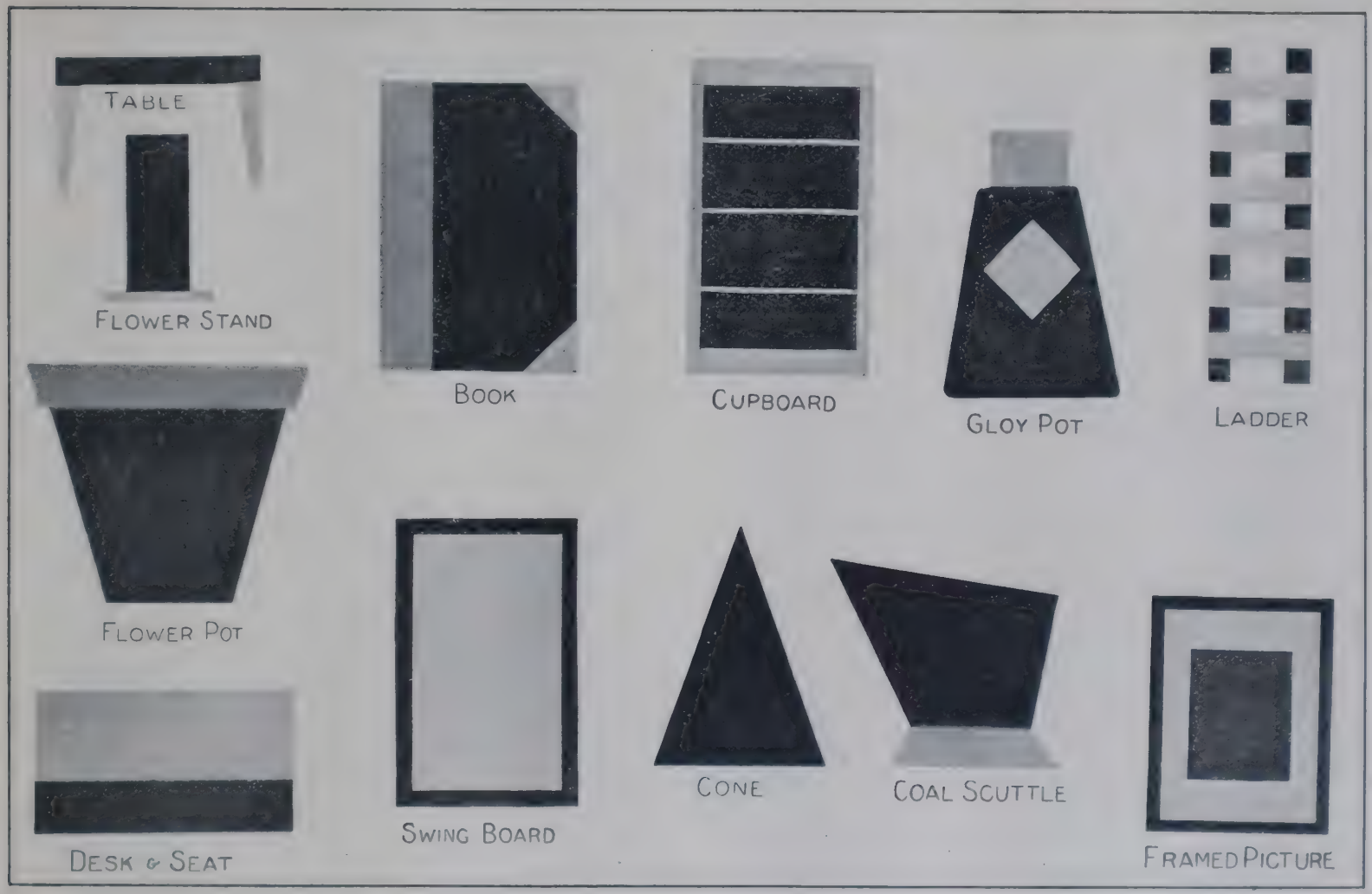


PLATE XXI.—An Introduction to Paper Modelling.

Children must early learn to rule, cut, and paste. The silhouettes are always measured from common objects; easy scales are chosen; fractions of inches are ignored at first; differently coloured papers are used. Arithmetic is closely associated with these exercises.

are taken from actual measurements of real objects, the measurements being afterwards reduced to certain scales. It is hardly necessary to point out that such exercises as these can quite as readily be carried out with the Metric System as with the English System of measurements. Compasses and set squares can be used when reasonably possible; and, as the work proceeds, the individuals can be questioned as to the reasons for this and that operation, and the values of certain angles; additional questions in practical geometry will come to the mind of any teacher of an upper class. Many practical exercises in mensuration can be framed in connection with needlework, besides those concerned with the buying and selling of all garments. The graphs can be suitably carried out on squared paper, as the mechanical exercise of preparing such paper would be of little value; indeed, it is most important that exercises should be free from purely mechanical operations as soon as possible; for directly a child ceases to think of what he is doing, the work ceases to be of much benefit. The elevations of doors and windows, and the plans of the room, playground, and adjoining garden, afford excellent exercises for group work. The children work in twos and threes, going from place to place with paper, pencil and tape measures, and producing a rough sketch with the measurements added; a careful drawing can then be made, and differently coloured pieces of paper used for the various objects; and the accuracy of the work can be instantly tested.

On Plate XXII. will be found another set of suggestive exercises which can be carried out by the class on the days when arithmetic is taken manually. It has been before mentioned that in carrying out the manual work illustrated in this book, it

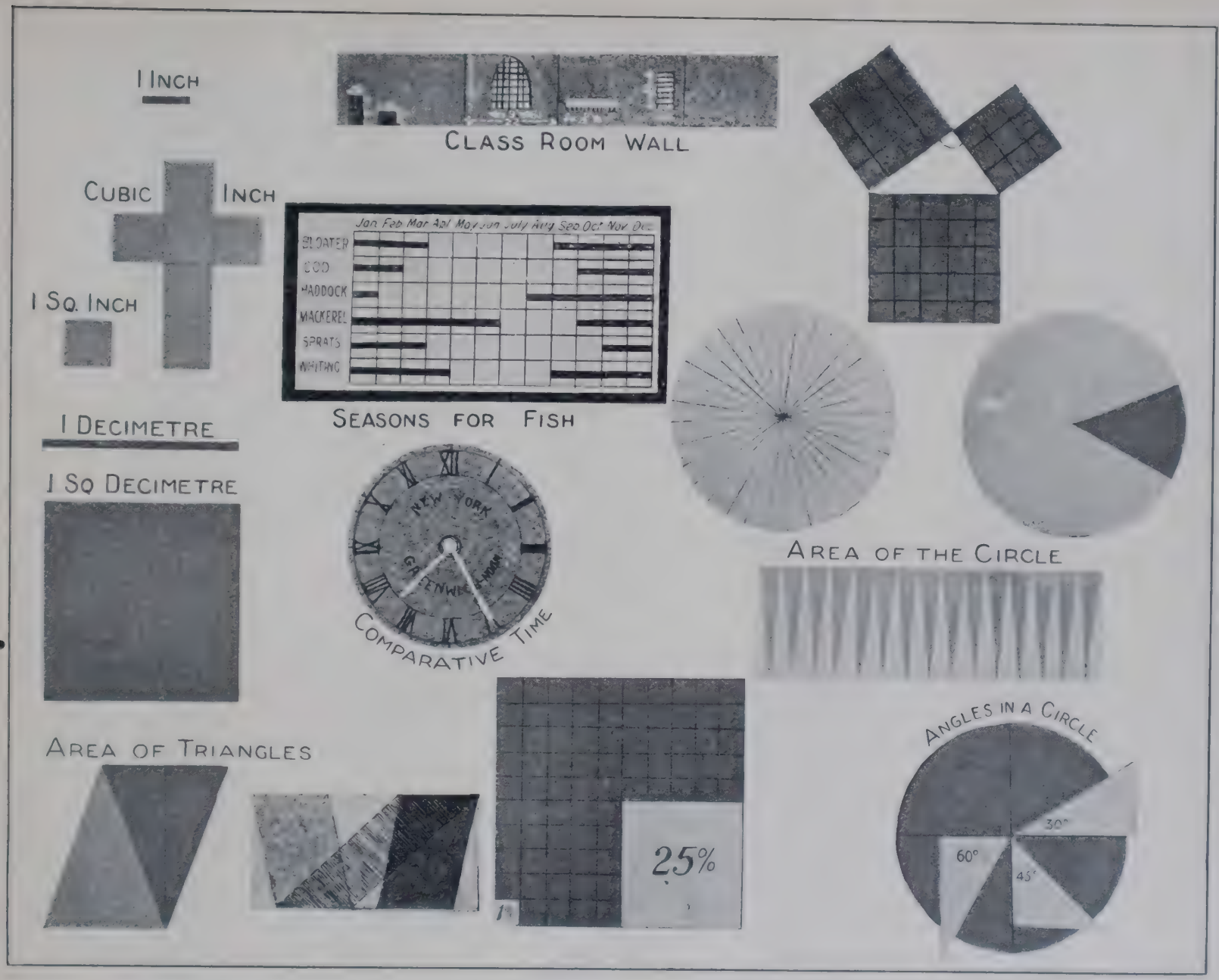


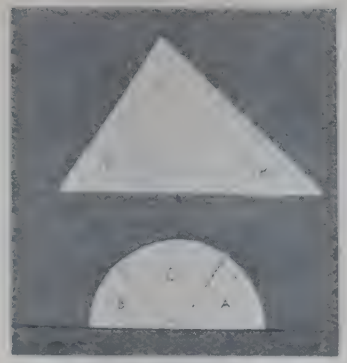
PLATE XXII.—Mensuration and Arithmetic.

For these concrete illustrations real objects are measured; and the shapes are ruled on coloured papers, cut out, and pasted in the arithmetic books. The figures are then always to hand for future oral and written exercises. Much skill is required to reduce to scale accurately, and to superimpose several coloured pieces.

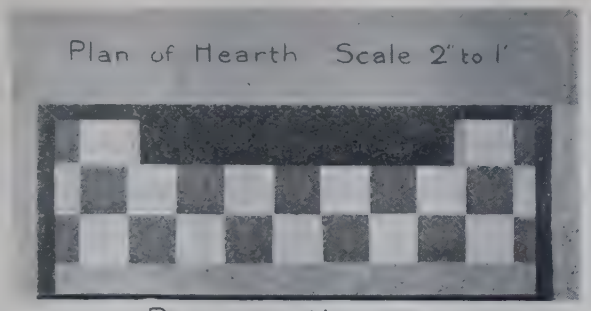
has not been found quite practical to take a small portion of *every* lesson manually, when extra apparatus such as coloured paper, paste and scissors are required. The ordinary school lessons are too short to allow sufficient mental, practical, and written work to be done at one time: it has been found far more satisfactory to do real handwork *continuously for one week* during the whole time usually devoted to arithmetic. When constructing models, or pasting the various objects in the arithmetic book, sufficient spaces are left for the working of exercises in connection with them *during the next three weeks.* This arrangement of using one week in every four weeks for constructive arithmetic works easily and well.

During another week the lessons in geography are treated manually; and during another week history, or some other subject, is taught in a somewhat similar manner, taking care that there is not the same kind of handwork carried out consecutively. For example, it is better to allow plastic work in geography to follow after paper work, and wood and cardboard work to follow plastic work; so that there are varieties of operations and materials.

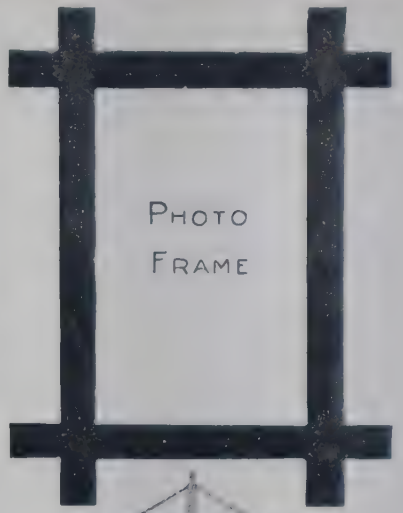
Referring, then, to Plate XXII., there are paper exercises showing the relation between the linear, square, and cubic inch, and the linear and square decimetre; the cubic decimetre is not given on the diagram, because of its size. The strip of paper folded in four places has been made from the real measurements of the walls of the classroom, and it is a capital and useful exercise in connection with the sums relating to painting and papering the walls of a room. In the centre is an illustration of a simple paper graph which indicates the seasons when certain fish are suitable for

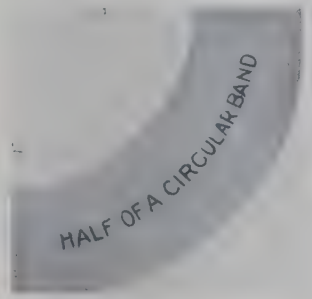


THE ANGLES OF Δ = 2 RT.∠S

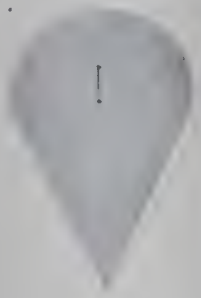


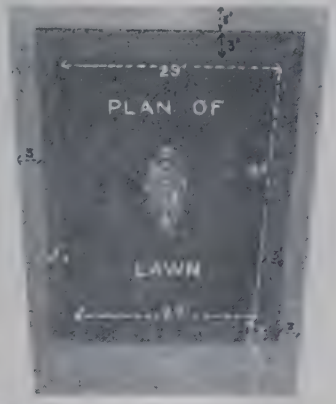
PLAN OF HEARTH





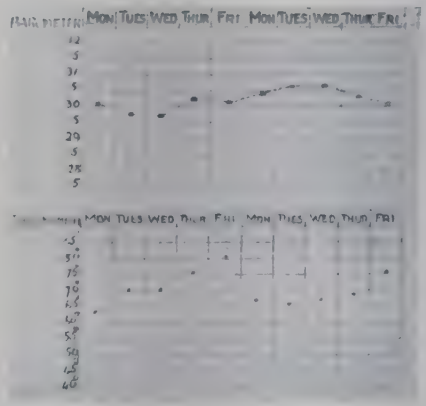
A KITE

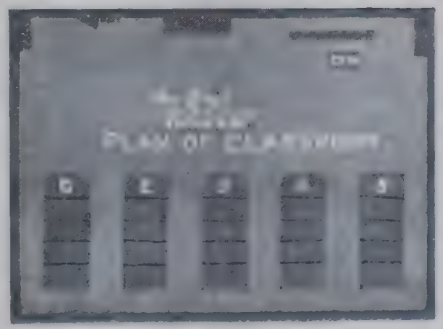




PLAN OF GARDEN LAWN

CLASS ROOM DOOR





CLASS ROOM WINDOW.

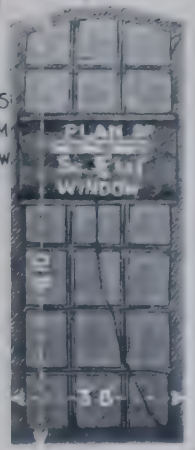


PLATE XXIII.—Mensuration and Arithmetic.

For these concrete illustrations, real objects are measured; and the shapes are ruled on coloured papers, cut out, and pasted in the arithmetic books. The figures are then always to hand for future oral and written exercises. Much skill is required to reduce to scale accurately, and to superimpose several coloured pieces.

food. The squared paper is cut out (for practice in accurate and careful work), and pasted on to a further sheet of paper, along the margin of which the various numbers and figures are placed. With the exception of the diagram on percentages the exercises are closely connected with practical geometry. The proof of the rule that the square on the hypotenuse is equal to the squares on the sides of a right-angled triangle can be very convincing if treated in the manner illustrated; the proof of the area of a circle requires care and skill, but still is a good exercise for the upper class; the value of angles in a circle can be proved by means of preparing triangles of paper containing angles of 45°, 30°, and 60°; the rules relating to the areas of parallelograms and triangles further afford really useful manual lessons in arithmetic. If, during these lessons, the teacher constantly talks to the individual scholars, and encourages every attempt on their part to ask questions for information, excellent practical work in arithmetic can be regularly carried out.

On Plate XXIV. is a group of eight paper models, suitable for the teaching of volume and capacity. The construction of all these little models is based on the same principle—little flaps are left on the edges, which, when bent in, are fastened with paste, and hold the model together. It is best for the teacher to make a model first, and then the children can see it taken to pieces; after having fashioned one or two, they will very readily produce any of the others. In constructive work, the child works more intelligently if shown the finished model at first, instead of being directed by the teacher in short stages; the child, otherwise, does not trouble to see beyond the immediate stage on which he is engaged, and the teacher is apt to do all

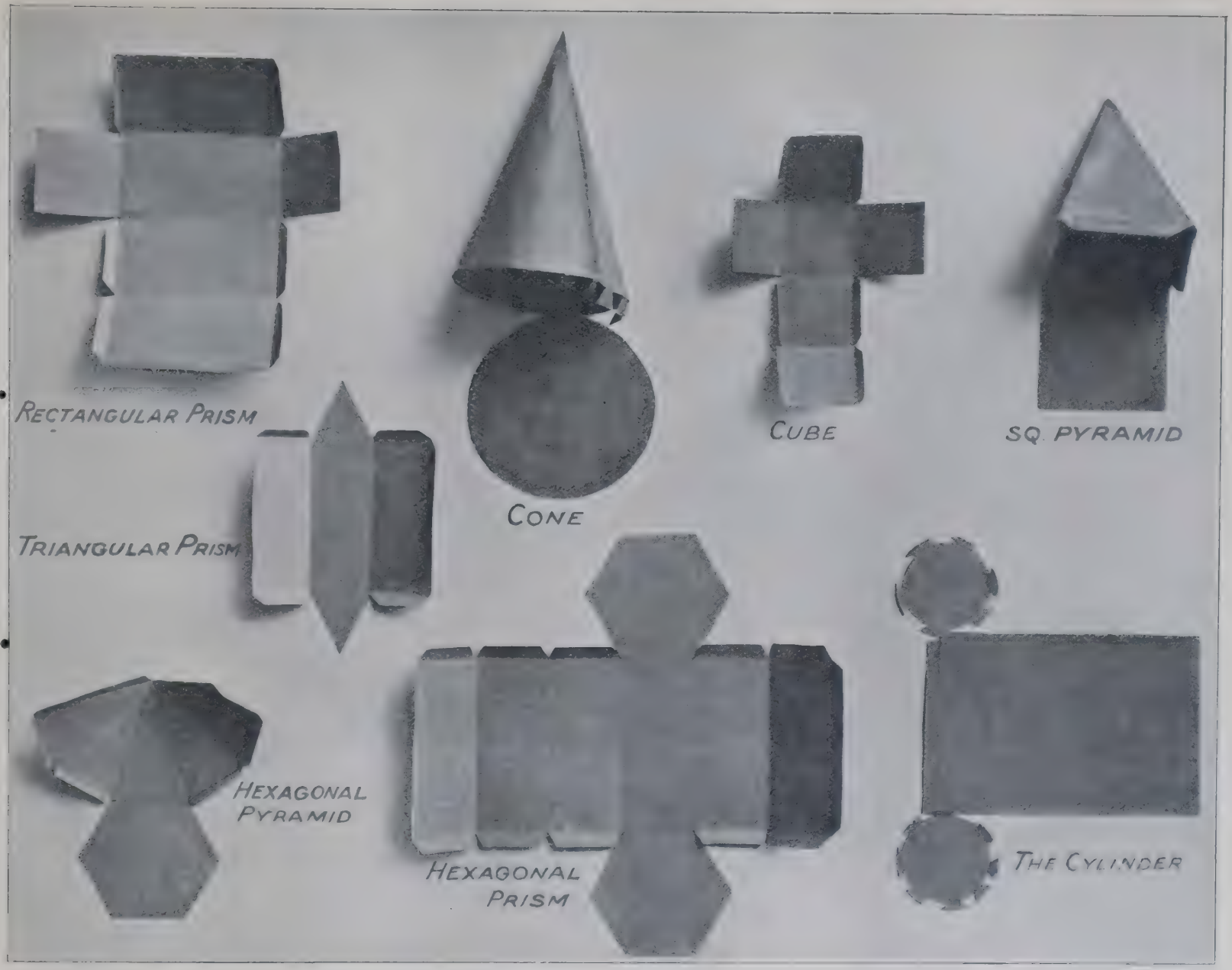


PLATE XXIV.—Paper Modelling in Arithmetic.

For the purpose of teaching volume and cubic measure, paper or cardboard models are frequently required. If the flaps are left unfastened, one face of the model can be stuck in the arithmetic book for future reference.

the thinking. The compasses must be used, and a good deal of practical geometry is incidentally learned; here there will be found sufficient scope for all the ordinary work in connection with the teaching of volume and cubic measure. Plenty of further exercises, with differently shaped and irregular objects, can be included if necessary.

Summary of Constructive Work in Arithmetic the greater part of which is shown on the Plates.

LOWER DIVISION:—

1. Making plastic and freely cut paper objects for early exercises in counting.
2. Cutting out in coloured paper and fastening in the exercise books the silhouettes and plans of various objects after carefully measuring the same; *e.g.* pen, pencil, scissors, book, desk top, pictures, b'ackboard, cupboard door, window, coins, ink pot, straw hat, weights, measures, boy.

   A number of these are shown on Plate XIX.
3. Cutting out strips, squares, circles, and superimposing portions of other colours for the teaching of fractions. Plate XX.
4. Measuring easy distances on a map, and cutting strips of paper to an easy scale.
5. Group work:—Making a simple plan of the room in paper or clay: making a paper plan of the playground by measuring in steps.

MIDDLE DIVISION:—

1. Some flat paper work as in the lower division, more especially connected with the finding of the areas of easy objects; *e.g.* book, blackboard, picture, desk top, window, door. Plates XIX. and XXI.
2. Simple paper graphs as shown on Plate XXII.
3. Paper work in connection with fractions as shown in Plate XX. Circles should be used as well as squares and oblongs.
4. Measuring distances, heights, and rivers on a map, and cutting a length of paper representing the real length in a straight line.
5. Group work:—Making plans of room, hall, and playground in paper, thin cardboard, and clay.
6. Making paper and thin cardboard models of the cube and rectangular box.

UPPER DIVISION:—

1. Flat paper work to prove the various rules in fractions, using both English and Metric measures.
2. Making paper graphs as well as line graphs. Plates XXII. and XXIII.
3. Making models in paper and card, as shown on Plate XXIV., for the calculation of volume.

4. Various plans from actual measurements. Plates XXII. and XXIII.
5. Calculation of time at various places on maps, and making clock faces.
6. Making contours of portions of maps with superimposed papers.
7. Proving many geometrical truths by actual cutting out. Plates XXII. and XXIII.

VII.

NATURE STUDY

PLATES XXV. TO XXVII.

CERTAIN daily handwork in connection with nature study has already been fully referred to under the title "Rapid Sketching with Pen and Ink," and teachers interested in this subject are specially referred to that chapter. Therein is described how the children every morning bring specimens of plants, and other natural objects, for rapid reproduction in ten minutes, with the simple mediums of pen and ink: under existing school conditions a more useful and effective scheme of interesting the child in the world of nature, enlarging his outlook, and training him in accurate and careful observation, cannot well be devised. The objects themselves, with a reference to any of their former sketches, offer a wide field of work, round which to centre much real study of natural objects; for first hand observation is the essential of all good work in this most important subject. Nature study at second hand, either from the teacher or from books, is most unsatisfactory; unless it is merely to supplement the teaching already derived from close study of nature itself. Some of the specimens thus daily brought to school are placed in water in disused medicine

bottles and are distributed round the rooms, in suitable and available positions. A little label is hung round the neck of each bottle, on which is clearly printed the name of the specimen, the date of finding it, and also its place of origin. When the ordinary nature lesson arrives there is an abundance of material always ready for first hand observation; and such specimens are particularly valuable for use when the inclemency of the weather, or other causes, prohibits the doing of outdoor work.

A still further and very valuable side of this practical work can be developed by arranging for certain specimens to be pressed between blotting paper, with a weight on the top. When the plants are dry the children can collect, name, arrange, and finally frame them in the little frames as shown in Plate XXV. This method of storing the plants has proved most useful and successful; the collecting and pressing can be carried out in every class in the school, beginning with the five-year-olds; but only the children from about ten years of age can reasonably be expected to frame the specimens in the manner about to be indicated. The specimens of the little ones need not be wasted; they can be mounted on cards, and arranged in order of shape, or colour, and utilised for drawing and clay modelling; always, however, the work should be done by the children, no matter how incorrectly, or how badly. In all these practical lessons it is the child who must really do the work; the little ones ache to use their own hands; and nothing but listlessness and unrest can be expected from young children who are merely told to *watch* and not to *do*.

From the earliest years children must be encouraged to reverence nature; they must bring only just sufficient of the desired specimen; vandalism of any kind must

PLATE XXV.—Passe Partout Framing.

Children's nature specimens are mounted by scholars on pieces of cardboard and framed under glass with gummed strips of cloth or paper. These framed specimens are particularly valuable in nature and drawing lessons.

be deprecated at every stage. The little frames referred to above, are what are generally known as "passe-partout" framed pictures. The specimens are fixed with tiny gummed strips of paper on to a card of suitable size; and, according to the age of the child, they can be arranged in some simple, natural order. A piece of medium cardboard is then taken, the exact size of the glass; or rather, it is better in practice to cut the card to fit the glass—a much more easy operation—and then four pieces of passe-partout binding are cut the exact lengths of the card. Passe-partout binding consists of rolls of paper, or thin cloth of various colours, covered on one side with fish glue; the rolls can always be obtained from photographers, but any stationer will supply them. The two longer strips are laid flat, and moistened with a wet brush; the card and glass held in position, are then accurately laid on one half of the one piece lengthwise, pressed tightly, and the remaining half bent over on to the glass, and gently and firmly made to adhere. Then, without allowing glass and paper to get out of position, the opposite edge is treated in the same manner, and allowed to remain a moment while the two end pieces are prepared. Two corners of the end pieces are cut off from the centre outwards at an angle of 45°, and afterwards moistened and fastened as in the case of the other pieces; the mitred corners should come to the front, so as to give a better finish to the work if desired; but it may be mentioned that the whole is not quite so firm as when the mitreing is not done. A short loop of tape can be fastened on the back of the card with fish glue, and strengthened by placing a piece of cloth or paper across the back of the tapes, with the same adhesive.

Any child who is fairly adept with the fingers can carry out the whole operation in ten minutes, and there is a fairly permanent record of the subject which can constantly be referred to either for drawing or nature lessons.

Very cheap glass can be used for this way of mounting pictures, as the sizes are usually small; those in the illustration are six and a half inches by four and three quarter inches.

This method of preserving flat specimens will be found more useful than that of placing them in books; unless, of course, the school is building up a herbarium; but even then, there will always be some specimens over, which are put to better use if hung about the rooms: and the children much prefer to see their best drawings, which can be framed in a similar way, kept clean for a year or two, rather than have them dropped in the wastepaper basket when too dirty to keep. Again, the framed picture can be presented to the maker when there is no longer room or use for it.

Only three of the objects on Plate XXVI. have any bearing on nature study; the other objects are mentioned under the light woodwork scheme.

The large barometer face, the maximum and minimum thermometer, and the ordinary thermometer face are made with wood and cardboard; they are large models, about two feet long, which are hung up in every room. Two children from each room take the readings from the real instruments out of doors every morning, and then, with the class attending, set the dials of the models. This has been found a most practical way of dealing with the daily

readings of these instruments, as every child can then see what the weather indications are; and they will be the better able to take accurate readings themselves when their turn for doing so comes round. The measurement of the rainfall is taken at the same time, and all the readings are marked on a suitable calendar; then at the end of each month several arithmetical exercises are worked in connection with the same. It is, perhaps, hardly necessary to point out that the models of the instruments can be made almost as well in cardboard only, when wood and tools are not available.

Plate XXVII. shows the important connection which woodwork has with the teaching of nature study; although ordinary wooden cases and boxes could be used for some purposes. The first is a box suitable for the keeping of larvae; the plant on which the caterpillars feed can by the method indicated be kept in water; and thus it is not necessary so frequently to renew it. Down the front of the box a piece of glass (which has been removed for photographic purposes) is slipped. In the centre of the plate, the box with a cabbage leaf in the bottom of it is another form of larvae box readily made in wood; a portion of the top is covered with muslin, and in the front is a piece of glass to enable the daily development of the insects to be observed and recorded. In all classes, charts are prepared and kept showing the growth and various stages of these living creatures, from week to week, or at longer intervals.

Some specimens of the butterflies and moths which have been reared in the school are preserved in small wooden boxes made by the children; the front and

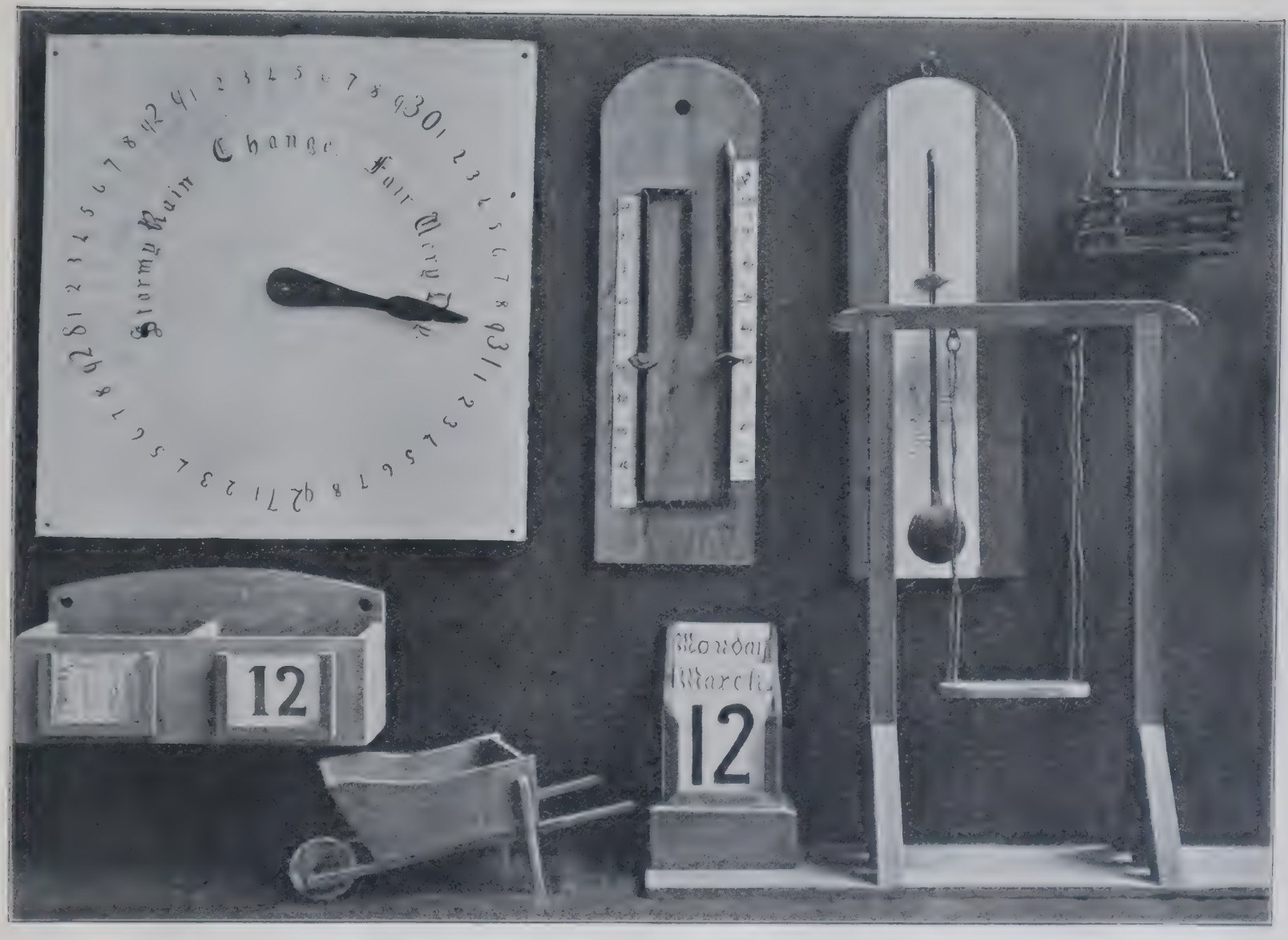


PLATE XXVI.—Wood Work in Nature Study.

The models of the barometer and thermometer with moveable hands are made in wood, so that the whole class daily learn to use the real instruments. The swing and barrow are made for the infants' floor modelling and for drawing.

top of each box has glass fixed in with the passe-partout binding previously mentioned; these natural objects are then of great use for drawing and painting, particularly during the winter months.

Other boxes in which to preserve different kinds of seed vessels, geological and other objects, can be made, all of which the nature student will constantly require. The goat caterpillar at the foot of the Plate is a blown specimen, preserved in a cardboard box with the usual glass front.

Owing to their environment, it is not possible for all schools to obtain natural objects; but it is now becoming very common for plants and objects to be sent to town schools in the midst of squalid surroundings, where flowers and plants receive, perhaps, even greater care and study than in schools where they are so common. Sometimes, however, it is not possible to procure even a few common plants, flowers, insects, and natural objects: then recourse must be had to first hand observation, from such objects as can be kept and grown in school. Half a pint of broad or French beans, soaked in water, will provide a most satisfactory introduction to the subject of germination; provided that every child has a specimen, and carefully dissects and examines it for himself. This can be followed up by planting in moist blotting paper or sawdust, several more bean seeds, some being placed in the light, and some in the dark, and then careful sketches can be made every few days, showing the relative rates of growth, and the varying effects of environment on the life of the plant.

Mustard and cress, peas, acorns, wheat and bulbs can all be brought into

PLATE XXVII.—Wood Work in Nature Study.

Two varieties of larvae cases are shown, and also boxes for the preservation of nature specimens, butterflies, etc. The small boxes are very useful as woodwork exercises, and the preserved specimens are very valuable for future reference and painting lessons.

requisition for at least some slight insight into the realms of nature, when it is not possible to include nature study as a subject of the school.

A very great deal of practical nature work is done in the school garden quite apart from the proper gardening course. The girls of every class cultivate the flower borders, tend the roses and climbers, and keep the lawn in order; the infants have a plot apart, where all kinds of experiments are made; where early spacing and measuring are begun, in order to plot out correctly; where the necessity for straightness, and the habits of law and order are early learned. The children have access to the garden at all playtimes, the big ones associating with the tiny ones in a common cause: and by this means, much real nature study of a valuable kind is done. During certain set lessons, every child, equipped with book and pencil or crayon, has a lesson direct from the growing plants, and sketches from nature what he sees; a list of questions, which can only be answered from observation in the garden, is often first placed on the page; so that, even with a large class, every child is at once actively engaged in searching for nature's answer. On every occasion when the garden is officially visited by the class, the sky and clouds are observed and noted; also the length of the sun's shadow, from a stick permanently placed for that purpose; and the direction of the wind, and its bearing on the state of the weather are actually recorded. These records are compared with previous charts when school is again entered.

Small plots of ground are specially cultivated, for the purpose of producing

flowers and vegetables, which may lawfully be picked at any time, when required for clay and plasticine modelling, or for drawing and painting.

Besides the before-mentioned observations which are made in the garden, and which have a direct bearing on geography teaching, other observations are not omitted; for instance, the action of wind and rain on the soil, the value of frost, and the difference between clay and garden mould. Round stones and odd geological specimens are discovered, each containing their hidden meaning, which is as interesting as a fairy tale to all; the worms, beetles and slugs, caterpillars, blight and birds, are examined in their homes; in fact, time is only too short to permit of all being done that can be done in the garden to lay the foundations of directed and first-hand observations.

A Short Summary of some of the Practical and Constructive Exercises in Nature Study.

1. Daily rapid sketching with pen and ink from natural objects. Plates VII. and VIII.
2. Placing single specimens in medicine bottles and labelling them.
3. Pressing and mounting flowers, leaves and grasses.
4. Framing mounted specimens in "passe partout." Plate XXV.
5. Making small cardboard or wood boxes, with glass in the lid, to preserve natural objects for drawing and examination. Plate XXVII.

6. Keeping daily records from wood and cardboard models of the barometer, thermometer, vane, etc. Plate XXVI.
7. Keeping records by drawing from actual living specimens, *e.g.* frog, butterfly, bean, bulb.
8. Answering questions by observing the living plant in the garden, when at all possible; and drawing from a growing plant in its natural surroundings.
9. Making wooden rearing boxes for larvae.
10. Modelling from natural objects in clay and plasticine.
11. Making paper or cardboard tableaux representing some natural scene. Plates I. and II.
12. Making large paper pulp models of natural surroundings. Plate XVII.

VIII.

PAPER, CARDBOARD, COMBINED CARDBOARD AND WOOD, AND WOOD MODELLING

PLATES XXVIII. TO XXXIa.

Most teachers are probably more familiar with the objects illustrated in the next half-dozen plates than with any of the previous forms of handwork, especially as there are before the public several very good books dealing more particularly with paper and cardboard modelling. In fact, considerable use of some of these books has been made for the purpose of introducing this work in school, as many of the forms given cannot well be excelled.

The principles which underlie the making of models in paper are very simple. The models are constructed from ordinary drawing paper, or from a stiffer kind of paper known as "carton," the latter being of various colours but a little more expensive. In measuring and ruling out the paper, flaps are left here and there on the edges, exactly in the manner indicated in the unfastened models on Plate XXIV., already referred to in connection with arithmetic. The paper is then bent, and

folded along certain lines, and fastened with paste or gloy by the flaps, on the inside —or sometimes to the outside—of the models. As a preliminary to the work, it is of great advantage if the children in the infant school have been used to making somewhat similar models, by the methods of folding and cutting with scissors, that is without the use of the ruler, as the children are then too young to be able to manage that instrument.

Following on from the folding exercises, the children should begin, both in arithmetic and other manual lessons, to measure, first with the ruler, short distances and shapes, and then with the tape measure, or with a rod marked off in feet, such larger objects as are near to hand. Flat silhouettes of the objects measured can be carefully drawn on differently coloured papers, cut out, and pasted in the drawing or arithmetic book.

The objects illustrated on Plate XXI. form a capital introduction to the subject of paper modelling. If the teacher thinks fit, the shapes can first be cut from one piece of paper only, merely representing by a rectangle the blackboard, the book, the picture, the cupboard, the desk-top, etc. Afterwards, as the children become more proficient in the art of ruling, measuring and cutting, two, three, or more colours can be used, thus affording plenty of practice in this early work. A good deal of practice is required, but there is no necessity to make the work too mechanical by the cutting out of squares and drawing of lines to produce different patterns; from the very first let the work be done from something real and concrete. It is a good plan always to correlate early ruler work with the practical side of cutting out and pasting; a square

or an oblong drawn with a pencil is not nearly so valuable to the child's mind as a rectangle actually cut from paper to represent a book.

The next stage in the work is to give every child an object, such as an envelope, a match box, a paper bag, a crayon box, or one of the objects shown on Plate XXVIII. If a supply is not easily obtained, the scholars of a class higher up in the school can produce a number of objects in a few minutes, as the work to them is naturally quite easy. The children then carefully take the model to pieces—one, at least, between two children should be supplied—and see for themselves how the work is done; next they carefully measure it, and from a piece of blank paper attempt to reproduce a similar model.

After a little practice of this kind the children can begin to make models of other objects, which cannot well be dissected, always, of course, measuring the thing themselves, and carrying out the work in the way they deem fitting. As an occasional exercise, the class should construct models from a rough sketch on the blackboard, so as to make a beginning in training the children to work from plans and elevations; indeed, easy plans, elevations, and sketches from objects fashioned by the children can be carried out at all stages. There is hardly any necessity to suggest what a large amount of practical geometry and practical arithmetic can be associated, as occasion demands, with any of this constructive work. The paper models illustrated on Plate XXVIII. are referred to under the Plate.

All models, as far as possible, should be made with the object of using the best of them for some definite purpose, although in the early stages this is not always

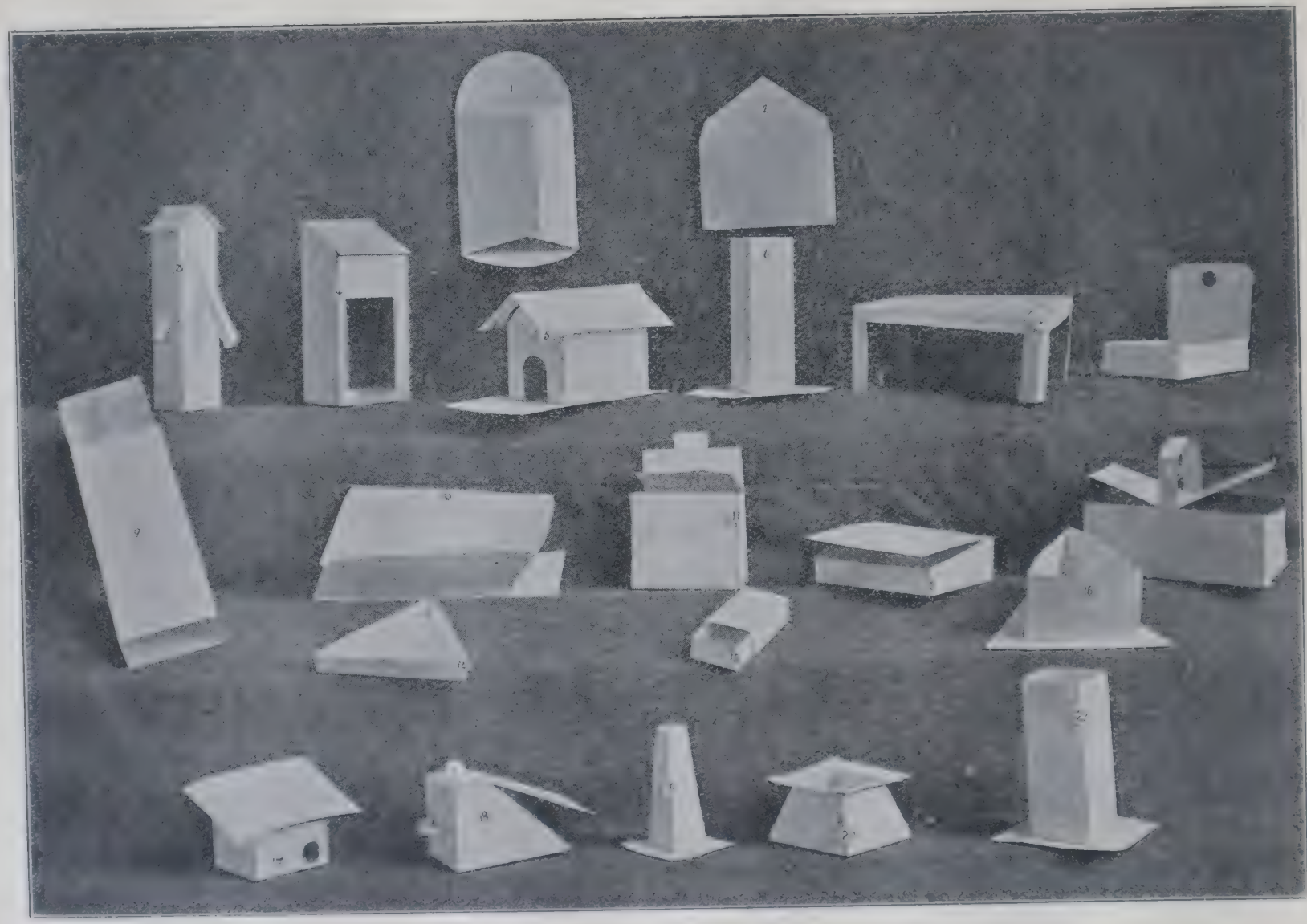


PLATE XXVIII.—Paper Modelling.

The models illustrated are made by children in the lower division; rulers, set squares, pencils, scissors, and paste are used. The objects illustrated are 1. Seed packet. 2. Envelope. 3. Pump. 4. Letter-box for door. 5. Dog kennel. 6. Flower holder. 7. Pail. 8. Tidy. 9. Pencil box. 10. Wash tub. 11. Tidy. 12. Top of teacher's desk. 13. Basket. 14. Tray. 15. Match box. 16. Inspector. 17. Nesting box. 18. Coal scuttle. 19. Flower holder. 20. Flowerpot holder. 21. Flower holder.

feasible. The pump, kennel, basket and bird box are afterwards used in a farmyard scene, such as that described in floor-modelling, Plates XXXII. and XXXIII. The letter-box, envelope, table, wash-tub and coal-scuttle form suitable furniture for the doll's house; and most of the other models can at least for a short time be utilised. On Plate XXIX. are illustrations of the next stage of work which is now done with cardboard of varying thickness. The children will require knives, straight-edges with a metal face, and something to cut on; for the latter purpose old millboards will answer very well, but odd squares of linoleum ten inches by ten inches are even better. There are two distinct methods of holding these models together; one by using flaps, as previously described under Plate XXIV., and fastening them with paper fasteners or glue; and the other by bringing the straight edges of the models together and fastening them with specially prepared gummed strips of paper or cloth. The latter method is falling into disfavour on account of the difficulty children have in making the objects hold together, owing to the spring in the cardboard; and again, the damp weather often causes the binding to come off; but what is perhaps worse is, that the time taken to complete a good model in this manner is far too long, and the exercise becomes purely mechanical. With the best children, however, some capital work can be obtained by these methods, and the models can be made most attractive in appearance if covered with fancy papers. The preliminary stages of the work in paper modelling having been mastered, the children will have no difficulty in measuring real objects, reducing to scale, and drawing plans and elevations of them. It is not always advisable, however, to work from the plan; rough sketches should

often be utilised, and many models should now be suggested and carried out by the scholars themselves; perhaps it may be well, particularly where the model is somewhat involved, to allow it to be done roughly in paper, in order to avoid too much waste of material. Three methods of doing cardboard work should then be used:—(*a*) From plans and elevations; (*b*) From sketches only; (*c*) From children's own suggestions. It is sometimes thought that boys and girls cannot work from plans, but in practice this is not found to be the case; in fact, it has been found easier for the children to build up their models in this than in any other way. Models in cardboard, as in paper or wood, should be of the utilitarian order when possible, unless specially connected with arithmetic for a set purpose; there is little pleasure in viewing a finished cube, rectangular prism, cylinder, etc., because natural objects seldom conform to such shapes. Objects which can be used in connection with the floor modelling, historical and geographical scenes, are at once pleasing and useful, involving quite as much work as is required; and they also afford more practical objects for subsequent drawing lessons in any class. The objects illustrated in Plate XXIX. are referred to under the Plate.

It has already been mentioned that too many models involving covering and binding should not be included in a scheme of handwork, and the next set described under Plate XXX. will almost certainly come rapidly into favour at an early date. In these models the base, or sides, or some important part of the model is made of thin wood; and then the cardboard is fastened readily and firmly with glue and brads, or brads only. This kind of work forms an excellent beginning for light woodwork, and

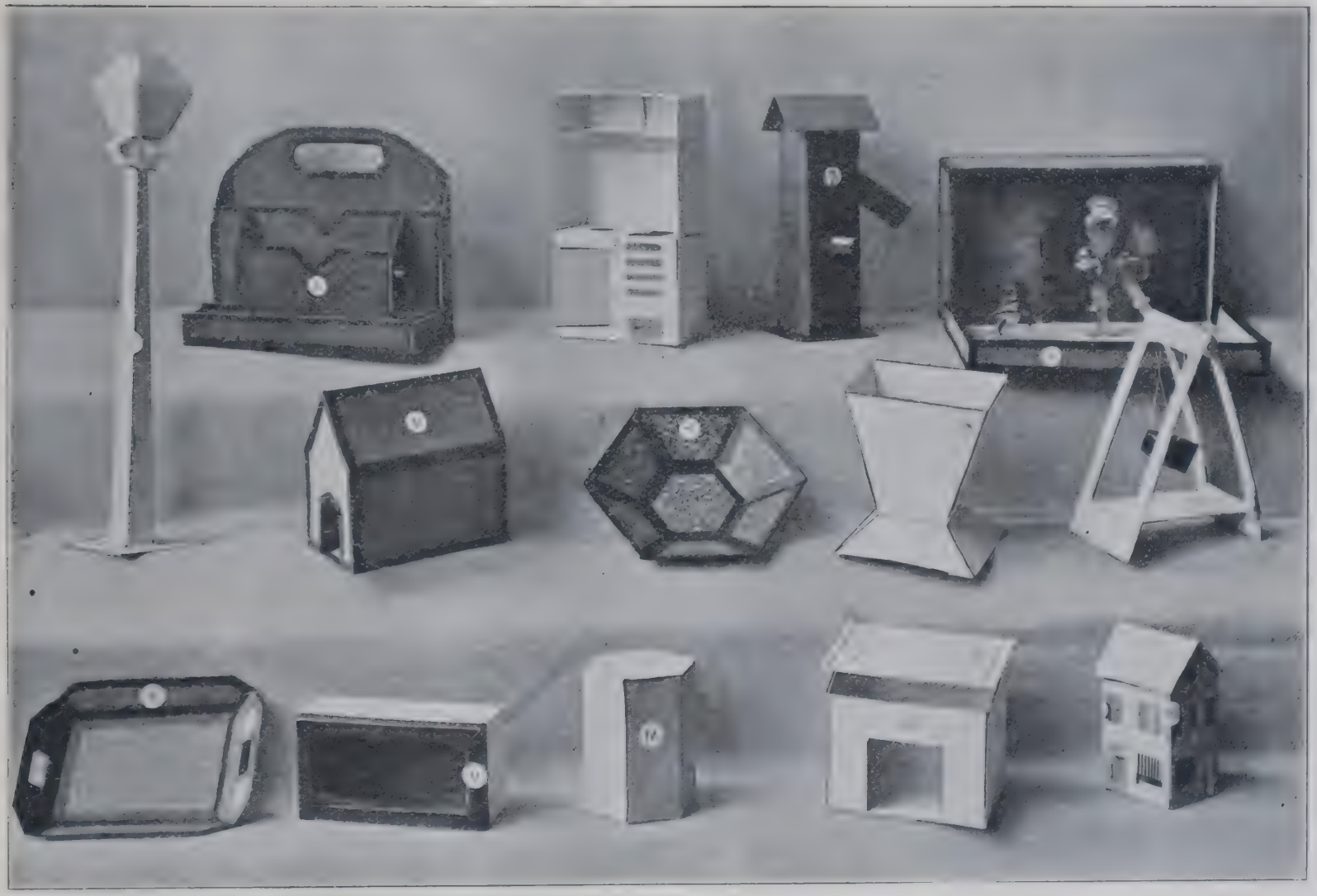


PLATE XXIX.—Cardboard Modelling.

There are two kinds of models illustrated, those covered with fancy papers and bound with gummed strips of cloth and those fastened by flaps with glue or seccotine. The objects illustrated are: 1. Letter rack. 2. Kitchen range. 3. Pump. 4. Box for paper tableau. 5. Lamp post. 6. Dog's kennel. 7. Hexagonal tray. 8. Waste-paper basket. 9. Doll's swing. 10. Tray. 11. Box for specimens. 12. Hexagonal prism. 13. Model of dustbin. 14. Toy house.

can be quite satisfactorily carried out by children of nine and ten years of age, boys or girls. Thin, smooth laths of about one-eighth of an inch in thickness, and in widths of one, two, and three inches, are all that is generally necessary. These strips, as a rule, have merely to be cut off into suitable lengths with a small saw; and as only a little sawing at a time is necessary, not more than a dozen saws will be required at any time, and one hammer between two scholars is ample. Brads of half an inch and three-quarters of an inch, and the usual glue pot or liquid glue, are suitable. Care is taken that the parts of the models which are curved or of awkward shapes are cut in card, as it is not practicable to use other kinds of saws and tools at too early an age, and under ordinary class-room conditions. It is a pity ever to prevent a child from making what he would like to make just because he has no suitable tools; by using cardboard in connection with wood, any ordinary model can be made. The models made by this method are far more durable than those made solely from cardboard; children much prefer to use hammers and brads rather than gummed strips of paper, and they will be all the better fitted to go on with woodwork at the next stage. Girls should certainly do some cardboard modelling if time can be spared, as there is a splendid field of work for them to associate the models with many forms of needlework. Plates XXXIX. and XL. give illustrations of combined cardboard and needlework. The models on Plate XXX. are: 1. Tidy with ends of wood. 2. Toy windmill with base and two straight sides of wood. 3. Handkerchief box with two sides of wood. 4. Model of pen tray with base and two ends of wood. 5. Tidy with base and back of wood. 6. Pigeon loft with sides and base of wood.

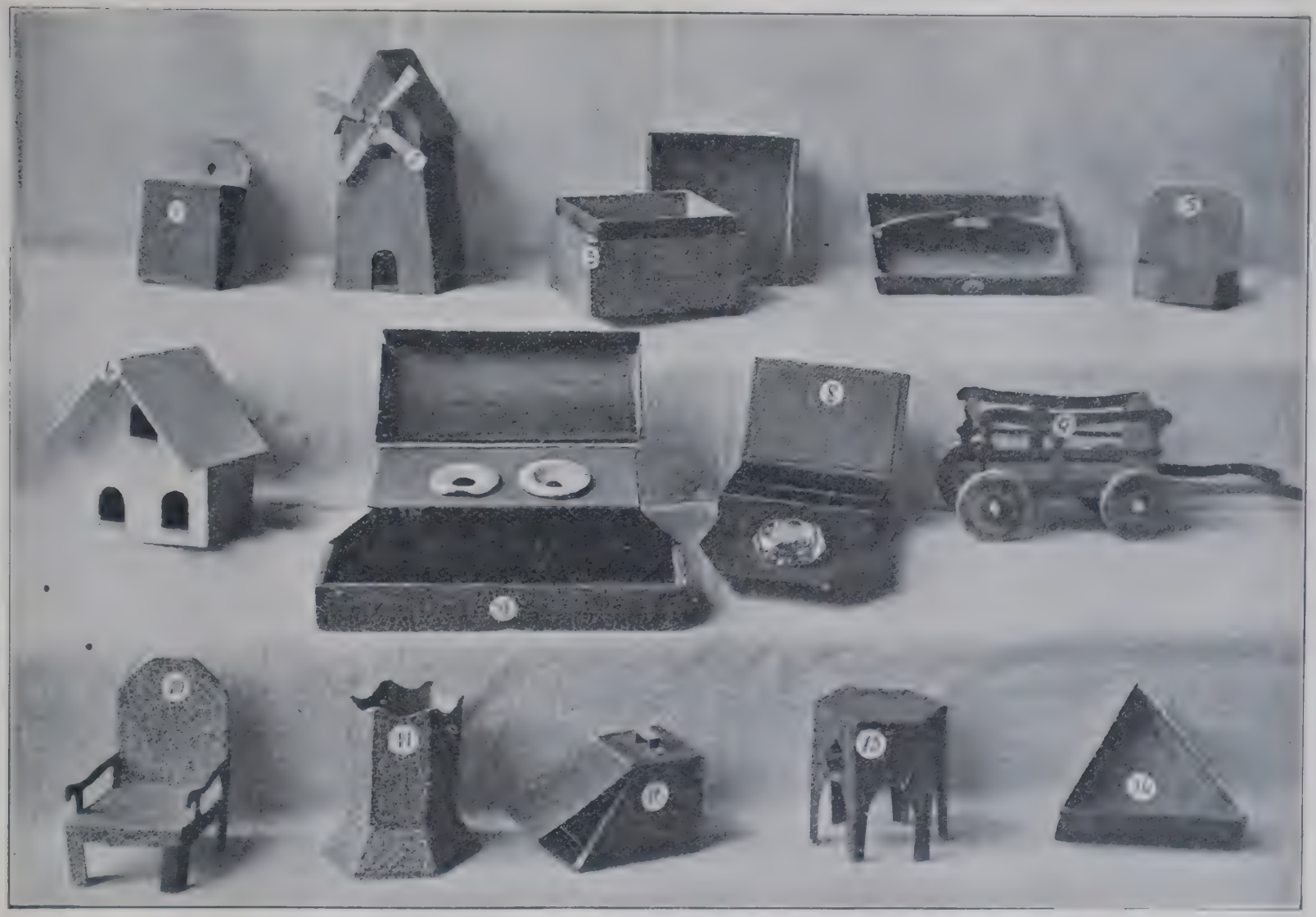


PLATE XXX.—Combined Cardboard and Wood Modelling.

Parts of these models are made in wood so that the cardboard can be fastened with brads. This method is a most satisfactory introduction to light woodwork. The objects illustrated are: 1. Tidy. 2. Windmill. 3. Handkerchief box. 4. Model of pen tray. 5. Semi-hexagonal tidy. 6. Pigeon loft 7. Ink stand. 8. Stamp box. 9. Toy waggon. 10. Doll's chair 11. Spill holder. 12. Coal scuttle. 13. Model table. 14. Tray.

7. Inkstand with base and two short sides of wood. 8. Stamp box with base and two sides of wood. 9. Toy cart with base of wood. 10. Doll's chair with base of wood. 11. Hexagonal spill holder with a double base of wood. 12. Coal scuttle with two sides of wood. 13. Doll's table with top and tray of wood. 14. Triangular tray with base of wood.

After a slight study of the illustrations it will be seen that a most satisfactory course of combined wood and cardboard can be framed for the middle classes of schools. Most of these models could not be made from wood only, under ordinary class-room conditions, and with children under eleven years of age; but by combining the two mediums there are not so many restrictions as to what may be done, very few tools are required, and the cost is much less than if the models were made entirely of wood. Many of these models can be constructed in the light woodwork class afterwards, if thought desirable.

Plates XXXI. and XXXIA. are illustrations of objects which have been made of the class described under the title "light woodwork." There has been a tendency to confine this kind of work to the using of strips of wood only, strips of slightly varying widths being cut off into different lengths and merely assembled into all sorts of more or less real or fanciful shapes. This method unduly restricts the work, and entirely misses the educational aim: it is a mistake to prevent a child trying to do a certain piece of work because he is unable to complete it in a manner that would be considered satisfactory from a carpenter's or joiner's point of view. The object of school woodwork, or any other kind of school work, is not to produce

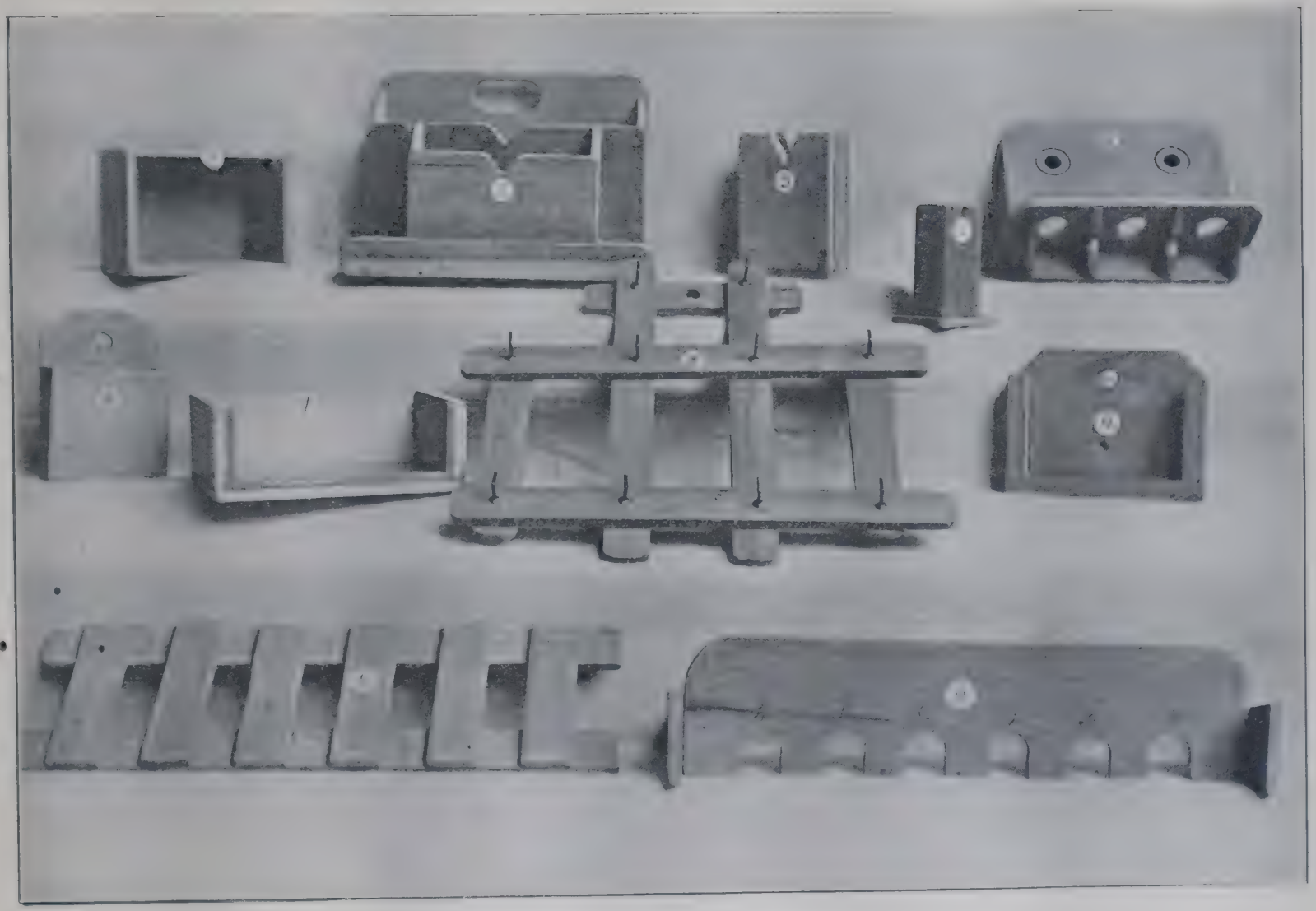


PLATE XXXI.—Light Woodwork.

These models are made from ¼″ bass of varying widths. The objects illustrated are: 1. Seed box. 2. Letter rack. 3. Card case. 4. Flower holder. 5. Scissors rack. 6. Tidy. 7. Specimen case for butterflies. 8 Key rack. 9. Name plate for door. 10. Toy ladder. 11. Marble board.

agricultural labourers, city clerks, or expert joiners, but, in the widest sense, to train all the faculties of the individual, to produce an active mind and a responsive hand; the time for dealing with specialised work is not yet. The models referred to in the plates have been made entirely from bass wood, generally of one-eighth or one-quarter of an inch in thickness, and of one, two, three, four, and six inches in width. Where opportunity for planing does not exist, prepared wood should be bought, and the models finished with sand-paper and files. As in the case of all other manual work, three main kinds of work should be attempted:—(*a*) Chiefly directed work under the distinct supervision of the teacher, and mainly from previously drawn plans and sketches; (*b*) Mainly undirected—from measurements of the real objects, and from direct personal observation of pictures and diagrams if necessary; (*c*) Group work and suggestive work—teaching individualism, self-reliance, and responsibility.

It is as well to make objects of some use, as the material now has a distinct value, and for class purposes many objects should be made which have a common centre as the aim, so as to avoid making a multiplicity of the same things. For instance, two or three lessons could be devoted to making objects entirely for garden use or in connection with nature study; a further set of lessons should be centred in making serviceable articles for school use; another set for home use; a set of models to be used in other classes to illustrate certain lessons; and a set of objects for games and play. The tools should not be too fragile, or the work is unduly and unnecessarily limited; the number and kinds of tools must be distinctly

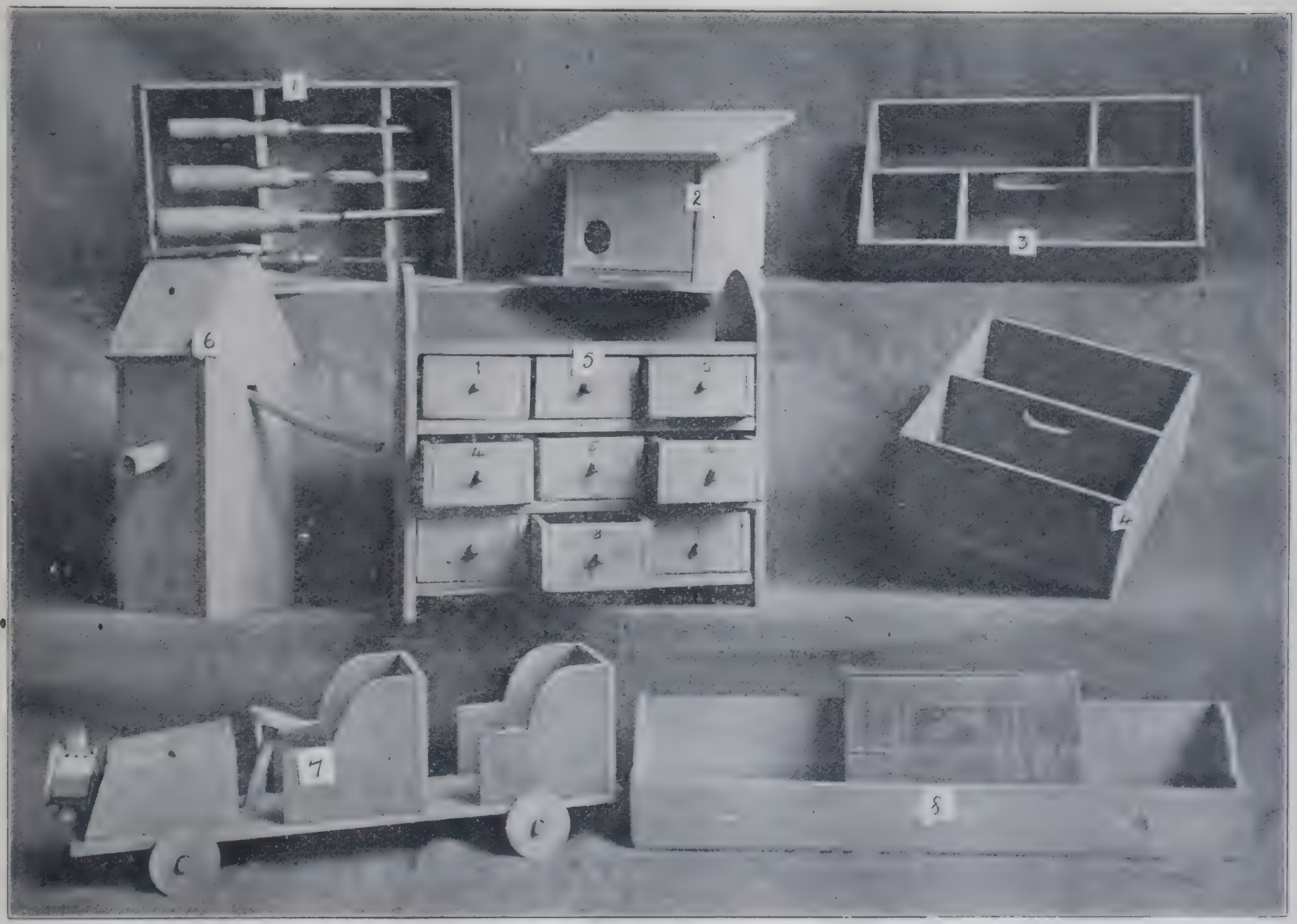


PLATE XXXIA.—Light Woodwork.

These models are mostly made for use in school. The objects illustrated are: 1. Box for chisels. 2. Nesting box for birds. 3. Pen tray. 4. Nail box. 5. Seed boxes. 6. Toy for infant. 7. Toy motor. 8. Book rack for teacher's de[illegible]

limited, because the time to be given to the subject is not very long, and, generally speaking, the conveniences are not yet all that is to be desired; the classes too are large, and in small schools the children in a woodwork class are of widely varying ages. Woodwork and its intimate association with other lessons has already been referred to, particularly its use in making supports for the many models before described, for the objects used in connection with nature study, and for the various large boxes containing cardboard models and tableaux. Plate XXXI. contains a number of models made from quarter-inch bass wood of varying widths, (the arrangement is photographic, and not in order of difficulty). With the exception of No. 11, all the models on this Plate are for school use.

The work in such models as are here shown can be done at the school desks, so long as prepared wood can be obtained. During the best weather many lessons can be taken out of doors if large platform tables or benches are available, and then it is well to do the noisy work out of doors, leaving the finishing for subsequent lessons. The models on Plate XXXIA. are referred to under the Plate.

IX.

FLOOR MODELLING FOR INFANTS AND JUNIORS

PLATES XXXII. AND XXXIII.

TEACHERS in infants' schools have no doubt felt themselves continually circumscribed in their manual work on account of the apparatus supplied, such as wood and stone blocks, being so tiny that it has not been possible to build suitable models to include a fair amount of the work of individual scholars. It is a common practice to make suitable models in plasticine or clay to illustrate, for instance, life on a farm, the varying seasons, the lives of foreign nations, or perhaps to draw, colour, or cut freely, or build from paper any varying objects which would illustrate the same scene. But there is constantly before the teacher the difficulty of providing sufficient material and room to weave these varying shapes into suitable surroundings, in order to convey to the infant mind something more than can be expressed in words even by the most imaginative and versatile teacher.

Floor modelling will, it is believed, appeal to those teachers who have for so long been fettered by the want of suitable materials. All that is necessary is to purchase about eighty feet of match-boarding or other thin wood about six

inches wide, about thirty feet of wood two inches by half an inch, and about thirty blocks of the same size as an ordinary brick, twenty half the size of a brick, and fifty each of one-quarter and of one-eighth the size. Twelve lengths of the boards about three feet long should be cut off and six of them joined together side by side, the two-inch wood being fastened across them. The twelve lengths will thus make two large squares. Eight pieces should next be cut about two feet long and made into two squares in a similar manner. A further sixteen pieces should be cut about one foot long and fastened in pairs to make eight squares, and several odd lengths of wood about six inches long should also be cut off. All the squares should be drilled with a number of holes about a quarter of an inch in diameter. There is now ready all the necessary apparatus for building innumerable models on a fairly large scale, models at which many tiny hands can work in unison and fashion numerous shapes and fanciful representations. Take, for instance, the model on Plate XXXII. Four of the largest blocks are first laid on the floor, and on them is placed a square of boards of the largest size, then four more blocks and perhaps some smaller ones are placed on them, and another small board is laid on; then a few more blocks and another flat board are added, and so on until the mountain depicted is as high as is necessary for the model. While the building has been going on, busy hands have painted with good-sized brushes a large sheet of needlework cutting-out paper with various colours from the snowline to the horizon, and then with a few tacks or drawing pins this is spread over the blocks, which are instantly transformed into the shape of a huge mountain. Paper or cardboard trees, fastened

PLATE XXXII.—Floor Modelling.

This model is built on the floor by young children. It represents a scene in Japan, and is made of wooden blocks covered with paper. The work of many lessons is combined in the model. (See letterpress for full particulars.)

on the backs to wooden pegs, are pressed through the paper into the holes which were made in the boards; animals and people, similarly supported with wooden pegs, can be made to climb the dizzy height. The remaining flat boards are laid on the floor, covered with painted paper, and all the various figures, which have been expressly made to complete the scene, are made to stand in the holes. In the illustration natural twigs and small branches of trees have been covered with pink paper cherry-blossoms, and the twigs easily stand erect in the holes; Japanese ladies, men, and children, cut in card and fastened on little sticks, are put here and there in positions to suit the requirements and ideas of the individuals. A small block of wood covered with corrugated or ordinary paper becomes a tiny house, and large houses in the foreground are built from blocks of different sizes. Lanterns, banners, and kites are cut from various coloured papers, crayoned or painted as may be desired; shiny paper represents the sea, and the lighthouse made by scholars in a higher class completes the scene. A model such as has been described can be built in a corner of the room, and objects can be added to it from day to day until it is sufficiently complete, or until it is time to begin again on another model. Then the objects can all be burned, and the square boards and blocks can be used continuously for the building of a great variety of models in succession.

Plate XXXIII. represents a scene in Holland, which can be readily built up in a manner similar to the one described, if square boards of varying sizes pierced with holes are provided, also a goodly number of variously sized wooden blocks.

PLATE XXXIII.—Floor Modelling.

This model is built on the floor by young children. It represents a scene in Holland, and is made of wooden blocks covered with paper. The work of many lessons is combined in the model. (See letterpress for full particulars.)

The large wooden models were made by older boys in the course of the light woodwork lessons, and have already been used as objects for drawing and for other floor models. The wind-mill and water-mill will turn round, the stable will hold good-sized clay or plasticine horses, the boats are partly wood and partly card and paper. On the card and paper shapes sticks of wood have been fastened with half-inch brads; the dyke has been covered with shiny paper, the land with paper painted green; and during the course of several lessons the model has gradually assumed its present form. Such large models as these offer a delightful field for group work amongst infants and juniors; the handwork in several mediums, paper, card, clay, and needlework, spreading over a week or a fortnight, has all been correlated in a way most pleasing to the children, and having much practical value. The little ones work with activity and determination to make something to help forward the grand picture which has been imagined and talked about for several days; and, what is far better, the work is so practical and easy to carry out at a small outlay for wood and a few hammers and brads; the rest of the apparatus will be found in every school. The models illustrated on these two plates are about twelve feet long and five feet wide; but their charm can hardly be realised from the photograph owing to the absence of colour.

X.

PLASTIC WORK

It is hardly necessary to write at any length on the value of handwork produced with clay and plasticine mediums, as several excellent books dealing with this important form of handwork are already published. It seems to be more a matter of use and a question of cost as to which medium the teacher prefers: plasticine is more expensive, but is easily kept in excellent working condition; clay is cheaper, but more trouble to keep moist and plastic, although it is exceedingly useful for the making of large models. Paper pulp is an excellent medium to use in the production of large group-worked models in connection with many subjects. Handwork with any one of these three plastic mediums is particularly valuable, because the use of it is not confined to one hand: it is *par excellence* a manual operation. A graded course of work can be easily arranged for the youngest as well as for the oldest child. Plastic work affords a capital means of providing for the freedom and spontaneity of movement which belongs to child-life; the materials are readily distributed and collected; and the best work can always be kept from lesson to lesson by supplying from the woodwork class long upright boxes about two feet by six inches by six inches, with a number of

movable shelves which readily slip in and out. The surface of the plastic work can be constantly obliterated and a new beginning made at once, which, to small children at least, is all important; and the work can be almost entirely carried out—and rightly so—by the fingers of both hands. Beautiful natural objects should be copied as often as possible, rather than any irregular shapes; by this means much valuable training of the eye and mind to the appreciation of form can be accomplished. The first lessons in writing can easily be learned with plasticine spread thinly on a board; and drawing and modelling of all kinds necessarily go hand in hand. There is great latitude in plastic work for individual excellence and original work; and it has also an important value for training the memory by suitably arranged exercises. With young children it is more usual to build up a model, *e.g.* a plant, by making the leaves, petals, etc., as single items, afterwards combining them into a whole; but with older children the more difficult operation of carving from the mass should be done. Clay or plasticine work is also valuable because it is not only a form of handwork quite different from that of paper, card, or wood, but also because it can be so readily adapted to assist other lessons; it is, in fact, easily correlated whenever desired. Nature study in bad weather can well be illustrated by the making of clay objects from the natural specimens which have already been stored as previously described under nature study; the keenest and most careful observation of the specimen is necessary, and ample talk between teacher and scholar takes place.

As a form of handwork to be frequently used in geography lessons plastic work has no equal in giving a change from other forms of work; map making of all

descriptions can be carried out with it, and a fair amount of work can easily be done in the usual half-hour lessons. More occasionally it can be used in connection with the history lesson, especially in those lessons which indicate the close connection between geography and history, such as the making of Roman walls, Druid circles, mountain and hill boundaries of countries, relief maps of such countries as Sweden and Holland, which will impress on the mind the effect of environment on the life, character and history of the people. With tiny children, plastic work is in constant requisition in the early number and writing lessons; and with all classes, its value in connection with the making of large group models cannot be over-estimated.

The work throughout is closely connected with drawing, as the movements are large, and the eye and hand work in unison. Plastic work is becoming more and more popular in schools, and has taken the place of many lessons formerly devoted to line work in drawing; but plastic work alone, as a school manual exercise, is not sufficient, for in all forms of handwork there must be great variety. It is well established that excellence in any particular form of handwork does not indicate any manual ability in some other form; therefore every kind of handwork that can reasonably and practically be carried out in a school should be done.

A Summary of some Exercises in Plastic Work.

LOWER DIVISIONS.

1. Early writing and drawing lessons on flat layers of clay or plasticine.
2. Making small objects for counting.

3. Making shapes for halving, quartering, etc., for early teaching of fractions.
4. Modelling from natural objects, *e.g.* leaves, easy flowers, oranges, apples, marbles, shells.
5. Modelling for geography, *e.g.* islands, capes, life-boat, rain-gauge.
6. Modelling for history, *e.g.* weapons, armour, portions of houses.
7. Making various objects for group scenes, *e.g.* harvest, spring, Eskimos.

MIDDLE AND UPPER DIVISIONS.

1. Repeating units in simple designs for training in accuracy and judgment.
2. Modelling from natural objects, and some work in carving out objects from the mass.
3. *Geography.*—Making maps from a photographic relief map; making parts of a country, and drawing contours; making portions of maps to a given scale.
4. *History.*—Making maps of roads, old walls, strategical positions; indicating on maps mountains, rivers, coalfields, etc., to show the influence of environment on the people; modelling historical objects, *e.g.* urns, vases, architecture.

XI.

NEEDLEWORK

PLATES XXXIV. TO XL.

NEEDLEWORK can be applied and extended in a great many directions, according to circumstances and the material at command. From the many fields of work connected with the subject, there have been chosen as special branches for description, doll-dressing, appliqué work, and needlework applied to cardboard.

If needlework is to be thus extended, a sewing-machine is invaluable ; otherwise time would not permit of the work being so fully treated ; seams and hems are quickly done by the machine, and time is saved for more intelligent work and for work demanding more skill. As a rule, large garments should not be made by the scholars ; there is too much purely mechanical work in them.

If manual exercises in paper work have been regularly carried out in connection with arithmetic, history, geography and drawing, as indicated in previous chapters, it will be found quite easy to get all the children to cut, first in paper, and afterwards in material, all their own garments chosen for the year's work, and also to cut the materials for the doll-dressing, appliqué and cardboard work. The paper patterns

and cardboard foundations can be prepared in drawing lessons as suggested in the time-table scheme. In the case of younger children there will naturally be plenty of doll-dressing, as it is far better to practise stitches on something real, rather than on something which is to be placed in the rubbish bag.

By a simple scheme of measurements, the elder girls should be taught to measure each other for a garment—say a plain blouse—and after cutting it out from their own measurements, should put it together with the aid of the sewing-machine. They should then use their knowledge of drawing by making a simple design for embroidery, which should be transferred (by means of carbon paper) to the fronts and wristbands of the blouse, each girl making a different design of her own, and finally embroidering it with suitable thread. As an alternative, appliqué work combined with embroidery can be used for ornamenting the blouse.

Special attention should be given to the fact that one garment is usually an adaptation of another, *e.g.* that a blouse, a camisole, and a dressing-jacket can be cut from the blouse bodice pattern; and similarly that a yoke can be used for a pinafore pattern, which, with the addition of sleeves and a little different arrangement, becomes an overall or a night-dress pattern. Now that magyar styles are so popular, the chemise pattern can be adapted to pinafores, dresses and night-dresses, which can be cut out by younger children who would find separate sleeves too difficult.

Fine needles and cotton should not be allowed at all for the younger children, and counting threads should not be permitted. There is no time for doing meaningless and useless exercises; once a stitch is learned, it should be immediately put into

PLATE XXXIV.—Doll Dressing.

The children choose their own materials from a bundle of remnants, and make the dress from some historical or geographical picture. The characters represented are: (Back row) Chrustabel, a Hindoo native, a Welsh girl, a Dutch girl, Teutonia. (Middle row) Salanio, Shylock, Antonio, an Eastern lady. (Front row) Portia, a Chinese lady, Jessica.

practice on something useful; and girls of all ages can be encouraged to learn as many stitches as possible, so that the girls with a gift for needlework in any class are not kept down to the level of those whose "fingers are all thumbs."

The work should be made as interesting as possible, and, as far as may be, the useful should be combined with the ornamental. Pretty colours in materials and threads, pretty simple styles and shapes in garments should be chosen; and an attempt made to obtain neatness and daintiness of execution with a good, strong and reasonably rapid style of household sewing.

As a girl learns to make household linen and garments, she can be encouraged to beautify them by hem-stitching and simple embroidery.

As knitting is taught in the lower and middle classes, the elder scholars can be taught crochet, and can work from books supplied to each girl, so that a great variety in work is possible; in this way the necessary trimming for household linen and garments made by scholars is obtained; of course, woollen garments in crochet can also be made, the girls working from books in a similar manner. Crochet is very useful to have at hand for filling up odd minutes.

A weekly supply of family mending, including household linen, tablecloths, serviettes, cotton and woollen garments, and stockings, may be brought to the school regularly after washing-day. Notebooks should be kept, into which all the needlework done by each child during the year can be entered by the scholar under dates; and diagrams and sketches of work should be drawn in the book, with particulars as to materials, quantities, and prices.

PLATE XXXV.—Doll Dressing.

The children choose their own materials from a bundle of remnants, and make the dress from some historical or geographical picture. The characters represented are: (Back row) Man and woman in the time of Henry I., Woman in the time of William II., King Arthur, Edward VI. (Middle row) Lady Jane Grey, child in the time of Henry I., a Druid, Henry I. (Front row) Child in the time of William I., Queen Elizabeth, Thomas Wolsey, a Viking girl.

Doll-dressing.—In doll-dressing, initiative is the chief object, and needlework is a secondary consideration. The child finds out a costume from pictures in books or elsewhere, and reproduces the dress to the best of her ability without help from anyone else. She chooses her own materials from a heap, and decides what colours are best suited for the purpose. If a child is too young to work a button-hole for her doll's dress, she simply cuts a hole; running may have to do duty for gathering. If the exact material required cannot be obtained, the best substitute available is used in place of it. The doll-dressing illustrated in Plates XXXIV. to XXXVI. is described under the Plates.

APPLIQUÉ WORK.

This work is done by cutting out designs from one material and securing them to another foundation material by suitable stitches.

Appliqué work lends itself very suitably to modern school requirements, as it combines drawing, cutting, and arranging; cultivates the eye in form and colour, provides a means by which the child can express her ideas and also reproduce the beautiful forms and colours already considered in nature lessons; and leads her to invent and arrange designs and patterns of her own, worked on something that will be used by herself or by some member of her family.

For the younger children, the shapes of leaves already studied and drawn can be cut out of green material (choosing a material that will not easily fray out) and stitched down to unbleached calico, or casement cloth, with satin stitch round the edges

PLATE XXXVI.—Doll Dressing.

These dolls are freely dressed by children to represent certain characters, and are then for a time left in boxes with glass sides made by the boys in the light woodwork class. Some of the dolls are specially valuable for lessons in geography and history for the younger children. Dolls in the case are: (Top case) Japanese lady, Rowena, Queen Bertha, Rebecca, an English child, an Indian Ayah. (Bottom case) An African chief, worker on a tea plantation, a coon, Hiawatha, a coolie, a coon.

of the design. Satin stitch is only applying, in a slightly different manner, the seaming and hemming stitch already learned. Unbleached calico is the cheapest material that can be used for a foundation, but casement cloth, or holland, looks better; and a little Dorothy bag for the child's own use will be a very suitable thing to begin with, and will also give pleasure to the maker.

Here it might be said that a child of seven will learn with ease and pleasure the simplest embroidery stitches, *e.g.* satin stitch and stem stitch. There is no strain on the eyesight; the needle is large, and the mercerised embroidery cotton is coarse; there is no counting of threads, and the stitches are quite large, much larger and bolder than in ordinary sewing. There is really no good reason why a child should not begin the simplest stitches of embroidery at seven or eight years of age.

A row of green leaves placed in a slanting position, a few cherries cut out of red sateen, a rabbit cut out in brown casement cloth (see Plate XXXVIII.), or two or three apples or pears or plums can easily be cut out by the younger children, and can be arranged on the bag material with small pins. Running stitches can then be put close to the edge of the appliqué; after which the satin stitch can be used to fasten down the design; and a stalk in stem stitch will complete the work. The first attempts will, of course, be extremely crude, but they will be the result of the child's honest endeavours, and will give her an opportunity to show any originality she may possess. If cost needs to be considered, a child will gladly pay a halfpenny for a bag made by herself; and scraps of coloured material like sateen, casement cloth, dress materials, or linings can usually be found. A bag four inches by five when finished

is large enough for a small child to make, and does not take *too long*. A small mat, or tray-cloth, or table-centre, with appliqué work at each corner, would be a suitable exercise, and a book cover to fit a book belonging to the child, with her initial in appliqué, is not beyond her power. The child can first draw on paper her initial; then, when satisfactory, put the paper pattern on the desired material; cut it out with *sharp* scissors, pin it on to the bag material and fasten it down, first with tacking, and then with satin stitch. Once a child has finished a little bag for herself she will be anxious to make something else, and will search about her home, in shop windows, and in books, for ideas which she can carry out on different articles suitable to her age. Appliqué work is very suitable for younger children as well as for the elder girls; there are no threads to count, no fine cottons and needles, no fine small stitches; and the pretty colours and shapes please the eye and interest the child.

CRETONNE APPLIQUÉ

For half-a-crown a good bundle of odd cretonne pieces can be bought at the half-yearly sales. Choose for the youngest children a cretonne with separate, bold sprays, or conventional designs, on a background of one colour: the designs should be quite simple in shape. After the child has carefully cut out the design, keeping well on the outside of the outline, it is next arranged in position by the child, tacked all round the edge, taking care to keep it perfectly flat, and, finally, applied with satin stitch, or, if the child can manage it, with button-hole stitch. Children eight years of

age seem to like working button-hole stitch on this work; the stitches, being large and clear, seem quite easy to learn. Other portions of the appliqué can be outlined with stem stitch. The cretonne appliqué is easier to do than appliqué with plain material, and it looks very effective when finished. As the child grows older and more experienced, very beautiful work can be done in cretonne and other applied materials, and the work can be used on clothes and many articles for household use.

ILLUSTRATIONS.

Beginning at the top left-hand corner of Plate XXXVII. there is shown a corner of a bed-spread of fawn-coloured casement cloth, on which an owl in brown velvet is applied with satin stitch: the eyes are embroidered on sateen; the feet are worked in light brown; the branch and leaves in green, and the crescent moon and stars in cream. Next along the top is shown a settee back of biscuit-coloured casement cloth, on which are applied tomatoes and leaves in red and green sateen. The curtain end shows a green border on a fawn-coloured curtain: the hulls of the little ships are green casement cloth applied with satin stitch in brown; and the sails are brown casement cloth applied with satin stitch in green; the pennon is embroidered in soft pink silk after being drawn with pencil on the material; and the ropes are also pencilled and worked in stem stitch in brown. These little ships are very easy to make. On the right is shown one-third of a cushion cover with a foundation of Wedgewood blue casement cloth, on which are applied conventional flowers of a

PLATE XXXVII.—Appliqué Work.

Various useful articles are shown, chiefly of casement cloth, ornamented with appliqué work in casement cloth, sateen and velvet applied with mercerised cotton. The appliqué for each article is cut from the child's own design.

lighter hue with black mercerised cotton in satin stitch. Under the ships are hung two little Dorothy bags of casement cloth, ornamented with applied flowers and little Dutch figures, designed by the makers. The tea-cosy in the middle is made of brown casement cloth, with an initial on one side and a conventional design on the other, both of old gold sateen, applied with various embroidery stitches ; the edges of the cosy are finished off with cord. Below the tomatoes is shown a portion of a cushion cover ornamented with cretonne appliqué ; then comes a table-centre of pink casement cloth, hemstitched at the corners and ornamented with a conventional tulip in white sateen ; next is a cushion cover in biscuit casement cloth, with green shamrock leaves applied in brown D.M.C. thread, with bows and knots in brown, and stalks in green. The next cushion cover has conventional butterflies applied in blue casement cloth, on a biscuit-coloured foundation. Under the owl is a little work-bag on which a child has embroidered initials ; next to this is a green handkerchief sachet on which are applied white lilies and green leaves from a design brought by the child who did the work ; the sachet is lined with quilted yellow sateen, and finished off with cord and a bow of yellow ribbon. Three little Dorothy bags are shown round the sachet, the designs on them being respectively, a dog, an elephant, and a bright green parrot in appliqué work, designed by the makers ; another bag on the right shows two ducks in cream sateen ; and the little bears are applied on a bib for a baby. The golden brown sateen leaves, applied on to a dull blue casement cloth ground with old gold D.M.C. (shown at the bottom right hand corner), are worked on a cushion cover ; but the beauty of the colouring is lost in the reproduction.

Plate XXXVIII. shows a miscellaneous collection of applied needlework including several different kinds of pincushions; the largest of these, on the left of the swan, has two quaint little figures worked in cross stitch in yellow and blue; the little basket pincushion to the left was originated by the maker. Next to the basket pincushion is a row of doll's chairs, sofa and table, made of pieces of cork and pins covered with bright coloured wool, the table legs being made of wire nails: these are very easily made by small children. The foundation of the swan fire-screen is a rather dark dull blue casement cloth, and the swan is cut out of white satin and applied with white mercerised cotton; the water is worked in pale blue, the water lily leaves are applied green sateen, and the bulrushes are worked in brown. On the right of the fire-screen is a lady's tie composed of scarlet satin flowers and hanging buds, with a safety pin sewn on the back. With a few scraps of pretty silks and satins or lengths of ribbon, elder girls will manufacture very pretty silk flower ties, and show considerable taste and ingenuity in the making of them—a work they enjoy thoroughly. Resting on the fire-screen is a wooden jacket holder which has first been covered with wadding and then with a remnant of pale-green silk gathered on; tiny bags of the same silk, filled with lavender, are hung at the ends and in the middle of the holder. Jacket holders can be bought at a penny each or cheaper; a number of them when covered will sell quickly. The little trinket or hairpin cabinet, on the left of the jacket holder, is made of cardboard covered with blue satin and tied up with blue ribbon. Below this is a bedspread (for a child's cot)

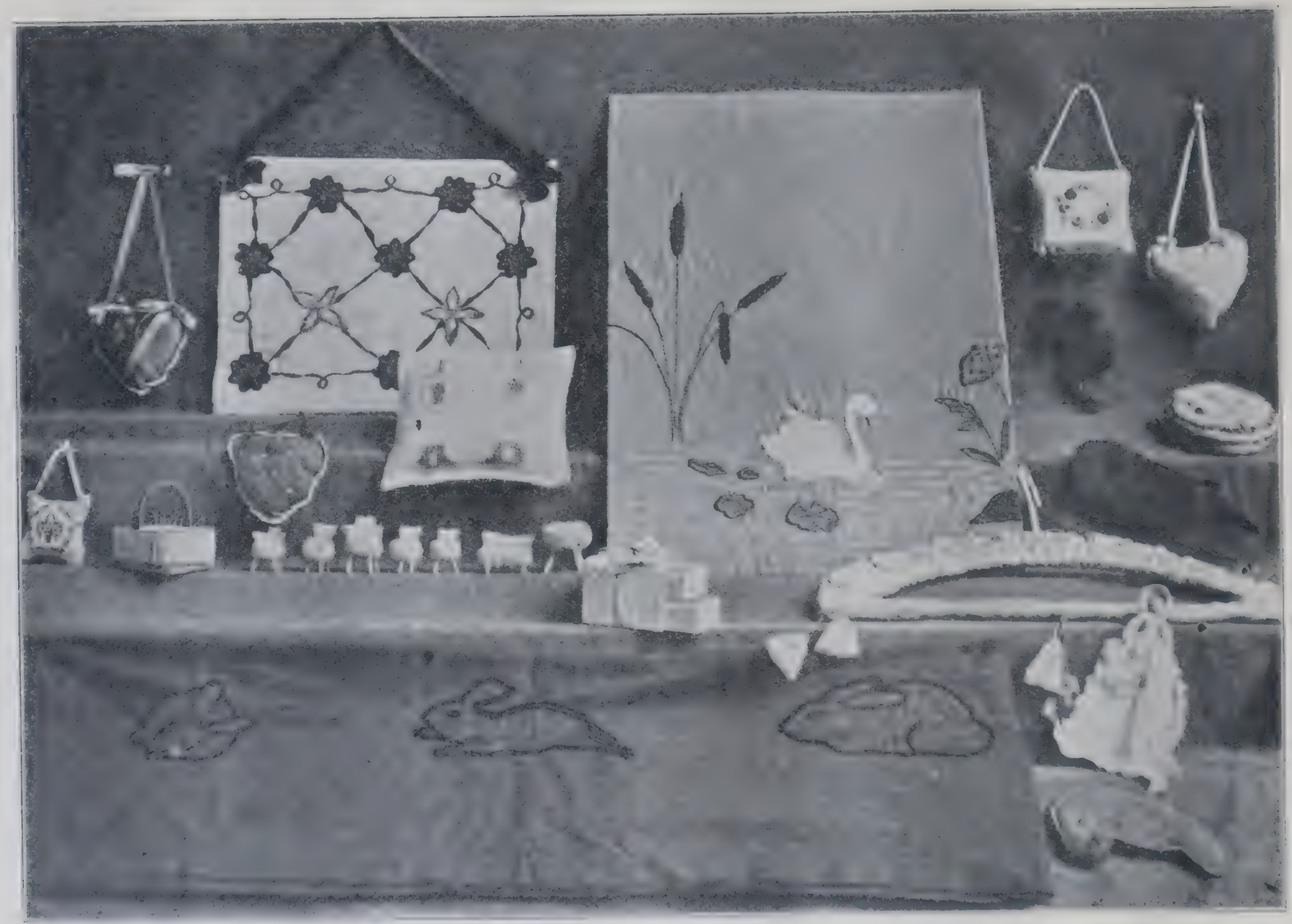


PLATE XXXVIII.—Appliqué Work and Miscellaneous Examples of Applied Needlework.

Various stuffed impressions are shown, a pocket holder, wadded and covered, and a doll's set of furniture in cork. A transfer was used for the appliqué on the swan firescreen.

on which are rabbits in appliqué work. The doll is another form of doll pincushion which is meant to hang up; the bottom portion of the dress is open at the sides, and covers a hanging needlecase, above which is the pincushion. Two cloth parrot holders for a teapot are shown; the eyes are boot buttons, and the breast part opens and slips over the teapot handle.

NEEDLEWORK APPLIED TO CARDBOARD MODELLING.

A very interesting application of needlework is found in planning out shapes of various articles such as wall pockets, baskets, pincushions, glove and other boxes, during the arithmetic or drawing lessons. These shapes can be afterwards cut out in suitable cardboard, and then covered with material which may or may not be previously ornamented with appliqué work or embroidery. This application of needlework can be carried out in all classes, suiting the experiments to the age of the child.

In Plate XXXIX. the letter rack shown at the top was covered with dark red casement cloth, all the edges were outlined with cord, and the word "Letters" was embroidered in yellow on the bottom division. The ivy leaf pincushion next to it is suitable for the younger children to make, and consists of two pieces of cardboard, shaped like an ivy leaf, and covered separately with green material, on which the veins have been outlined: a piece of flannel of the same shape is placed between the two covered pieces of cardboard, which are then strongly

seamed together, and the stitches concealed by "couching": a handle of millinery wire covered with ribbon, and pins stuck all round the edges of the leaf, complete the cushion. The crescent-shaped cushion is fastened with seccotine to its cardboard foundation, and a little loop of ribbon to hang it up by is slipped between at the same time: the shamrock cushion has a cardboard foundation, on which green velvet and the tiny cushion in the middle are fastened down with seccotine; and a ribbon loop and bow are used for hanging purposes. The shaving paper case has a stiff cardboard foundation, covered with velvet and plush; on the ribbon the word "Shaving" is embroidered in silk to match the plush: the flap portion on which the ribbon is placed lifts up, and the shaving paper is then seen beneath it. The flat hat-pin holder immediately below the crescent pincushion is worked with mercerised cotton on canvas, which covers a cardboard foundation. The wastepaper basket at the left-hand corner is composed of five pieces of cardboard covered on both sides with chintz seamed together at the edges, and finished off with gimp at the top and bottom: this basket requires *stiff* cardboard. The next little basket is rather more difficult to make, and will employ six elder girls if desired. The five cardboard portions are made double, *i.e.* two pieces of cardboard are used for each. The covering heliotrope sateen is ornamented with yellow butterflies and grass in appliqué and embroidery: the handle is made of a strip of cardboard and flat millinery wire covered with heliotrope ribbon: great care and accuracy are necessary in cutting and joining the basket, but it repays the child for the trouble. The useful work-bag has a

PLATE XXXIX.—Needlework, combined with Cardboard Modelling.

The cardboard is cut out (from scholars' drawings), covered with material previously ornamented, and the parts are usually joined by seaming.

circular cardboard foundation with the word "Work-bag" embroidered on the purple casement cloth. The blotter is covered with green casement cloth, with applied teddy bears of brown casement cloth, and the word "Blotter" embroidered at the corner. Between the cover and the cardboard foundation, a layer of wadding is placed; inside, the case is finished with brown sateen; and the blotting paper is held in place with a strip of narrow elastic stitched at the top and bottom.

The Dutchman calendar and pincushion provide work for the elder scholars; the cushion is seccotined to a cardboard foundation; similar pincushions representing old ladies and animals can be made, and a wide scope for ingenuity and originality is provided. The Welsh hat pincushion in cardinal plush with a black ribbon round it, is very attractive in reality, though, of course, the colour does not show in a photograph: this cushion has a cardboard base, and the conical portion beneath the plush is made of canvas stuffed with sawdust. Green sateen covers the watch pocket on which is embroidered "Time flies"; yellow ribbons give the finishing touches.

The last little pincushion on the right has loops of ribbon with a round velvet pincushion fastened down to a cardboard foundation.

On Plate XL. the blotter is covered with dark red casement cloth, on which are blue birds in appliqué work and embroidery, and the word "Blotter" embroidered in blue; the triangular hanging pocket is made of two pieces of cardboard covered with red casement cloth, with a piece of appliqué trimming as ornamentation. The circular pincushion next to it is covered with velvet and silk, and ornamented with tinsel;

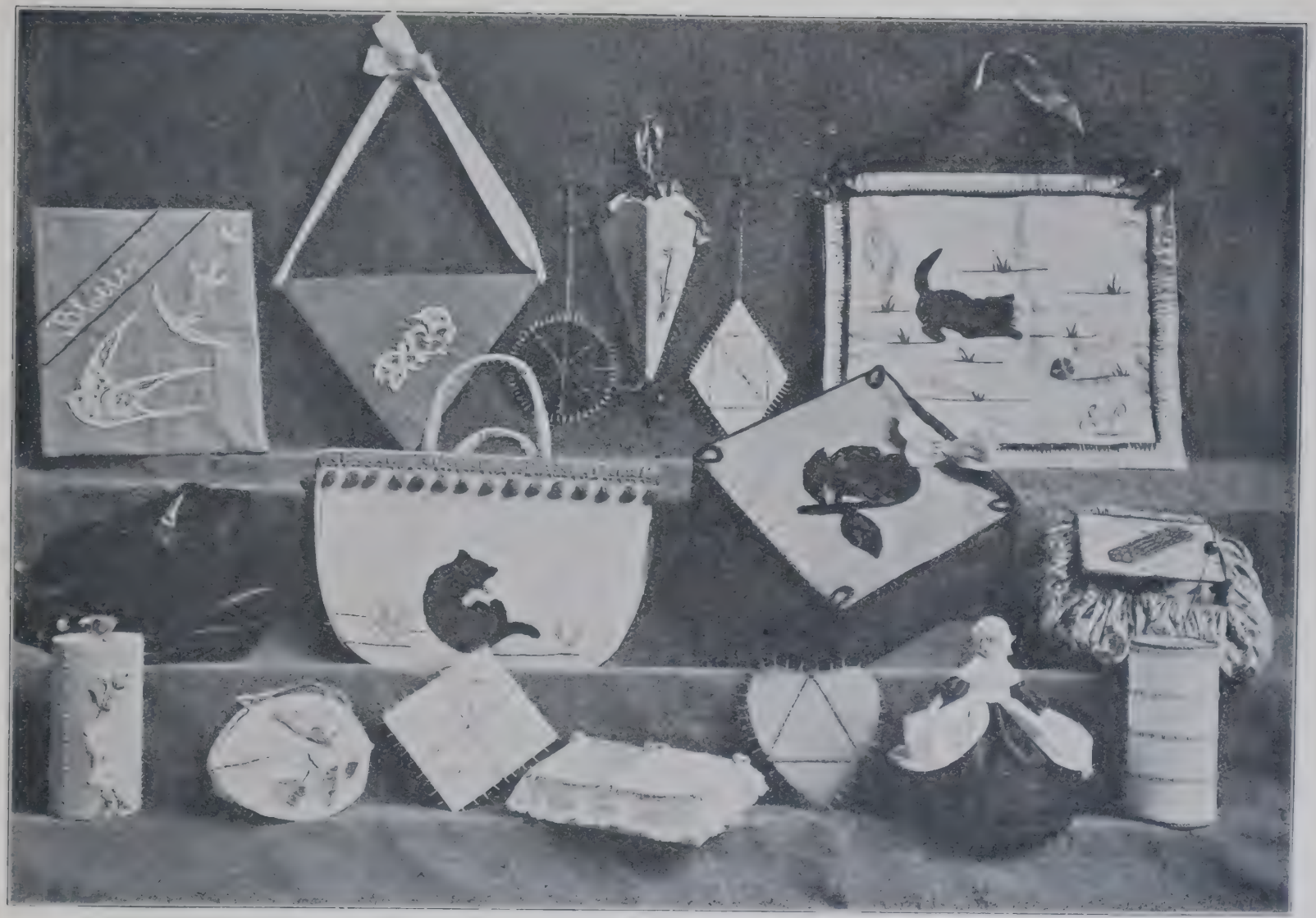


PLATE XL.—Needlework, combined with Cardboard Modelling.

The children make drawings, cut out the cardboard and materials by them, ornament the material, cover the pieces and stitch them together.

this and the rhomboid pincushion, as well as the square and the heart-shaped cushion below, are made in the same way as the ivy-leaf cushion previously described. Hanging above these two pincushions is the wall pocket, of which three pieces of cardboard form the foundation; these are covered with blue sateen, with sprays embroidered on two of them. The hanging nightdress case for a child has a stiff cardboard foundation, which is arranged to slip out when the case requires washing: the material is biscuit-coloured casement cloth, with a brown casement cloth kitten playing with a ball embroidered in gay colours; the edge is ornamented with graduated button-holing in brown, with green French knots. The little tufts of grass and the initials are in green. A collar bag in purple velvet on a circular foundation comes next—the word "Collars" embroidered in green does not show in the picture. The little hand-bag for a child is made of two stiff pieces of cardboard covered with biscuit-coloured casement cloth, and lined with blue of the same soft dull colour as the ball fringe round the top; a long narrow gusset joins the two side pieces. A kitten in appliqué work and one or two embroidered sprays ornament the sides. The square cardboard box is covered with red casement cloth, finished with cord and ornamented with a red plush appliqué spray fastened on with seccotine. The handkerchief case next to it is made of about four and a half yards of wide ribbon. Two squares of cardboard, about five inches square, are first covered on both sides with some of the ribbon and seamed all round; the rest of the ribbon is joined and gathered on to one square; the top edge of the ribbon is then hemmed and a wire is passed through the hem, gathering it up to fit the second square, which is sewn on by one

side and forms a lid. An oblong glove case can be made in a similar manner. Two hatpin stands are placed, one at each end of the bottom row, on Plate XL. These can be made of cylinders of cardboard filled with bran; the one on the left is covered with pink casement cloth on which a spray has been embroidered, and a row of French knots covers the join; the hatpin stand on the right is covered with canvas, worked with fancy stitches and finished with cord at the top. A pretty little basket to hold crochet is shown next to the hatpin stand on the left. Five pieces of cardboard are covered with pretty contrasting sateens, pink outside and green inside, and ornamented with pansies in appliqué work; the five covered pieces are joined by seaming and the joins concealed by "couching"; two handles of cord complete the basket, which was made by upper girls. The combined pincushion and hairpin tray in blue satin on a cardboard foundation and trimmed with cream lace needs no further description; and the pincushion doll on a circular cardboard foundation explains itself.

NOTE.—In "couching," several strands of silk or cotton are taken together and fastened down by straight stitches across the strands at intervals of about half an inch.

MATERIALS.

The materials for appliqué work and applied needlework need not be expensive, and the work when finished usually finds a ready sale. In order to spend the smallest amount on the materials it is a good plan to buy what is wanted twice a year, at the winter and summer sales. Trimmings by the dozen yards at 4¾d.

and $2\frac{3}{4}$d. per dozen; remnants of casement cloth, sateen, silk, satin, ribbons and oddments, which can be used in applied needlework, can be purchased at a small cost.

The materials for doll-dressing to illustrate geography and history, and for cardboard work used with applied needlework, can all be bought very much cheaper and in greater variety at the half-yearly sales. Small odds and ends like beads, tiny buttons, metallic braid, tinsel, and small showy ornaments are very useful for crowns, sceptres, royal robes and jewels for the historical dolls; bits of fur and imitation fur are very useful, both for historical and geographical dolls; and many small glittering things frequently thrown away, such as strips of gold and silver paper, can all be secured and put by till wanted.

It has been found that for upper classes, biscuit-coloured casement cloth, double width, at about $9\frac{3}{4}$d. per yard, makes a very satisfactory foundation for appliqué work; and, on this, sateen in different colours shows very well, and is inexpensive and effective at the same time; or casement cloth in different colours, or other material, can be applied. For the lower classes, unbleached calico is a good foundation to practise on, and, as *small* things only will be made, a dozen yards will last a good time.

CUTTING OUT.

Referring now to accurate constructive work required in cutting out ordinary garments, all classes can be trained to acquire a sense of proportion. First let

the children measure each other as required, and afterwards cut out patterns from these measurements. It is most important that all children, from the youngest upwards, should get a good general idea of proportion in garments. Beginning with very simple ideas in the lowest classes, and gradually learning by experience, children will be able to see at a glance if a garment is badly proportioned. For instance, a child in the lowest class can find, by actually measuring the next girl, that twice the measurement of her wrist is (roughly) once round the neck, and that twice the neck measurement is (roughly) once round the waist. A little set of exercises in constructive work could be founded on these measurements alone, *e.g.*

Cut out a narrow wristband the size of your wrist.

Cut out a wristband, allowing for buttoning.

Cut out a wristband to slip over your hand.

Cut out a dress neckband, allowing for fastening.

Cut out a chemise neckband to slip over your head when joined.

Similar exercises on other measurements will suggest themselves.

Actual measurement by the child will show that a double square is the best shape for a child's chemise; also why the chemise of a tall first class girl (actually measured) should be narrower. Older girls would of course find, and note down in their needlework diaries, the exact proportions discovered experimentally. The younger children can discover for themselves that the chemise sleeve would take about one-quarter of the length of the garment. A child in the middle class would,

by measuring her neighbour, find out that the length of her combination garment would be about three and a half times her neck measurement.

Other proportions would be similarly discovered and noted down. With cutting out taught constructively from the lowest classes upwards, a child by the time she reached the top class would cut out garments readily and quickly; and it would be almost impossible for her to cut out a garment wrongly, for she would have acquired the sense of proportion, and cutting out should present no difficulties to her.

Another point to notice in teaching constructive cutting out, is that one garment is an adaptation of another. The figure of the average child remains the same whatever garment covers it; therefore the proportions, and frequently the shapes, of the garments will have a common plan, varied according to fashion and circumstances. The little diagrams are intended to illustrate to the lower classes this adaptation of shapes. If a doll can be provided for each child, and the scholar measures the doll and cuts out garments to fit it, the lesson can be much more easily taught, as small patterns are so much easier for little hands to fold and cut out, and the space in the desks is limited. These patterns (Figs. 1 to 6) were originally intended for dolls, but failing dolls, they can be cut out by measurements from each girl's neighbour.

The chemise (Fig. 1), cut from a double square, becomes a combination by a slight difference in cutting the side and by cutting up the middle fold (Fig. 2). Of course, a combination of this shape would only fit a straight doll, and could

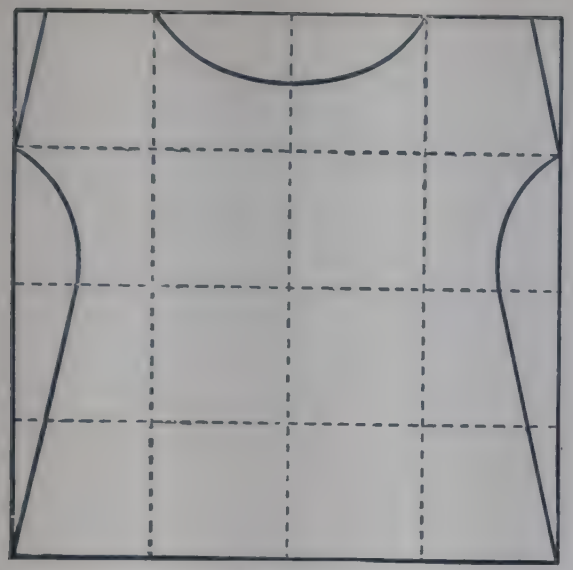


FIG. 1.

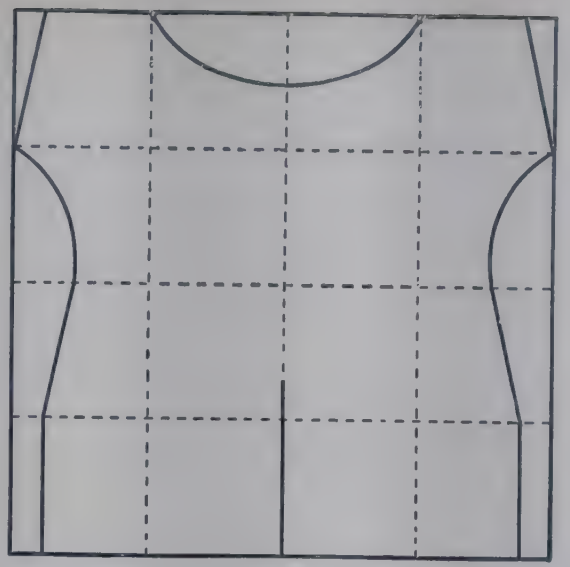


FIG. 2.

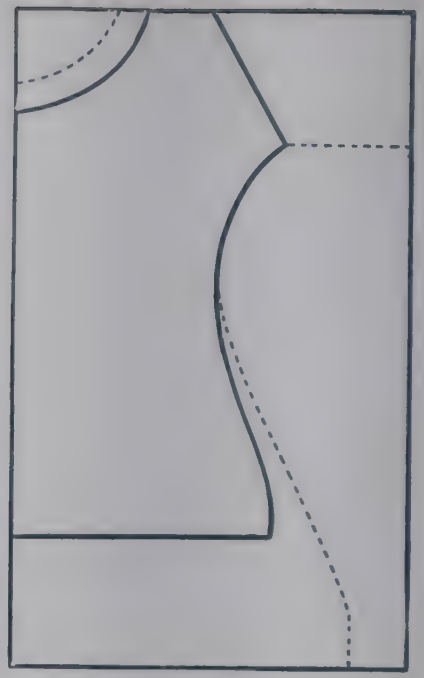


FIG. 3.

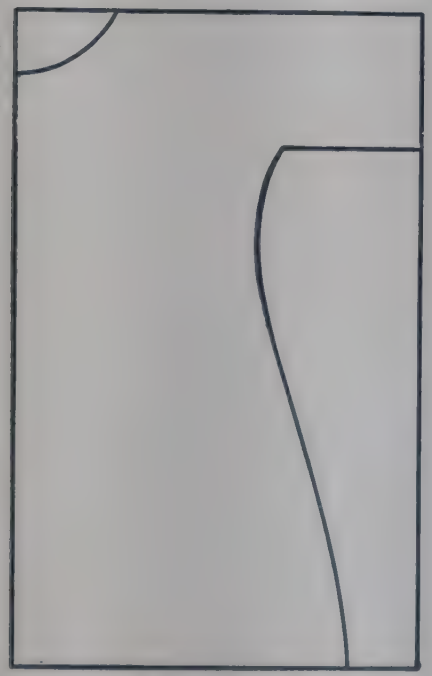


FIG. 4.

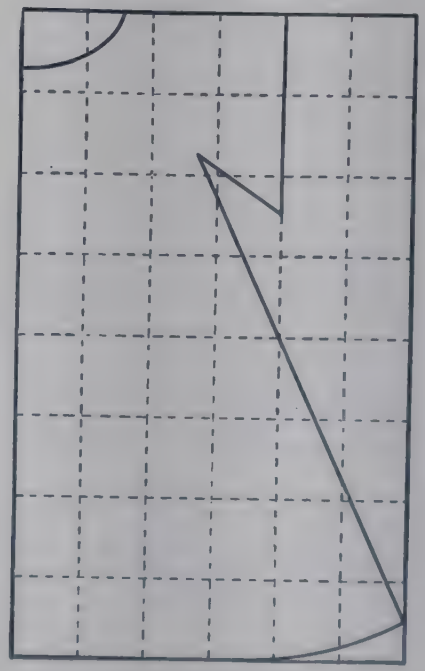


FIG. 5.

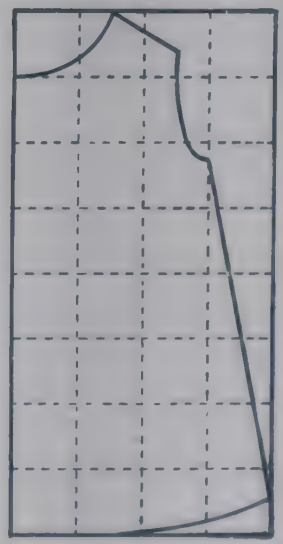


FIG. 6.

not fit a child. By lengthening the sleeves and skirt the chemise becomes a dress (Fig. 3), and the same pattern cut out in calico will make a night-gown (Fig. 4), or, if cut out in cloth or flannel and made to open down the front, can be used for a coat or a dressing-gown. The kimono pinafore (Fig. 5) shows a further modification of the pattern, and the princess petticoat (Fig. 6) shows the introduction of sloped shoulders. Fig. 6 could also be used as a pattern for a doll's pinafore if cut down the back fold.

General Summary of Suggested Constructive Needlework.

1. CUTTING OUT.

Lower Classes.—Measuring dolls (or children) and cutting out from these measurements (by paper folding) garments of the simplest form in paper and material, *e.g.* a doll's chemise, doll's combinations, doll's dress, night-dress, coat, and dressing-gown (from one pattern); doll's pinafore, petticoat, fisher cap, muff, knickers, stays, cloak and hood; boy doll's sailor trousers, blouse, collar and cap. The garments for the year's work will be some of these made up; there will be no separate sleeves, the magyar sleeve being used.

Middle Classes.—Measuring children of the lowest class for garments, and cutting them out by paper-folding in paper and material. No large garments to be made. The scheme to be a continuation and expansion of the work of the lower classes.

Suggested garments: Small child's chemise, magyar night-gown, kimono pinafore, magyar dress, magyar linen coat, princess petticoat in flannel, princess petticoat in calico, knickers. One, two (or more) of these garments will be made up by each child, according to circumstances. Separate sleeves need not be made.

Upper Classes.—Cutting out by paper-folding in paper and material. A simple scheme of measurement will be carried out, being a further expansion of the schemes for the lower and middle classes, each girl taking her neighbour's measurements.

Suggested garments: A simple blouse and garments adapted from it, *e.g.* camisole, dressing-jacket, underclothes of simple modern shapes; separate sleeves will be taught.

2. APPLIQUÉ WORK.

Lower Classes.—Cutting out, from drawings previously prepared by the children, simple shapes of leaves, flowers, and animals, and sewing them with simple stitches on to suitable small foundations, *e.g.* mat, tray-cloth, Dorothy bag, or on to the covering material for cardboard work. Cutting out simple patterns of cretonne designs and sewing them down similarly.

Middle Classes.—Cutting out, from drawings previously prepared by the children, simple sprays of flowers, fruit, leaves, animals or other designs; cutting out cretonne patterns; arranging these designs on a suitable small foundation, and connecting them when necessary with simple lines in easy embroidery stitches. The designs

can be used to ornament the covering material for the cardboard work if desired.

Upper Classes.—Cutting out, from drawings previously made by the children, different designs in various suitable materials, and applying these to children's pinafores, bonnets, dresses, bags; to cushion covers, night-dress cases, short curtains, table-centres, table-cloths, or other articles. Some designs may be cut from chintz or cretonne, and applied with embroidery stitches. Coverings for cardboard work can be previously ornamented with appliqué work. The different parts of a design can be connected and further ornamented with various embroidery stitches according to the capability of the child.

3. CARDBOARD MODELLING AND NEEDLEWORK.

Lower Classes.—Shapes suitable for flat pincushions will be previously prepared by the scholars, *e.g.* square, diamond, oblong, heart, triangle, circle, octagon, pear shape, crescent. These can be covered with material and two of a similar shape sewn together. Simple shapes for tidies, wall pockets, watch pockets, letter cases, and needle cases can be covered with material which may be previously ornamented with appliqué.

Middle Classes.—Drawings for suitable cardboard models will be previously prepared and cut out by the scholars. Suggested articles: Hatpin stands, covered boxes, wall pockets, glove and handkerchief cases, which may be ornamented with appliqué and embroidery stitches.

Upper Classes.—Drawings for suitable cardboard models will be previously prepared and cut out by the scholars. Suggested articles: Work cases, needle cases, work baskets of different shapes, hanging needle cases, combined hairpin tray and pincushion, letter rack, photo frame, book cover, blotter, small waste-paper basket, flower-pot cover.

XII.

TOOLS AND MATERIALS

PLATE XLI.

On Plate XLI. will be found illustrations of the tools which have been used for the making of the paper, cardboard and wood models, referred to in this book. The "Gloy" has been found a most satisfactory medium for all kinds of work in connection with pasting; it is more liquid than ordinary paste, and not so liquid as gum; it keeps good indefinitely in an open bottle, and never cakes or hardens. Other forms of paste, which are quite as serviceable, will be known to many. The safety straight edge has a bevel to protect the fingers; and along one edge is a piece of zinc which prevents the ruler from being cut with the knife. The hammer is an ordinary riveter's hammer with a handle of smaller size than usual; small brads, or even nails two and three inches long, can safely be driven in with this tool. A set of four chisels, ranging from one-eighth to three-quarters of an inch, is kept for any special work in modelling, which cannot well be done with any other tools. Large sized glue pots should be used—two will generally suffice—and, if possible, arrangements should be made for a gas connection in every room, so that an ordinary gas cooking ring

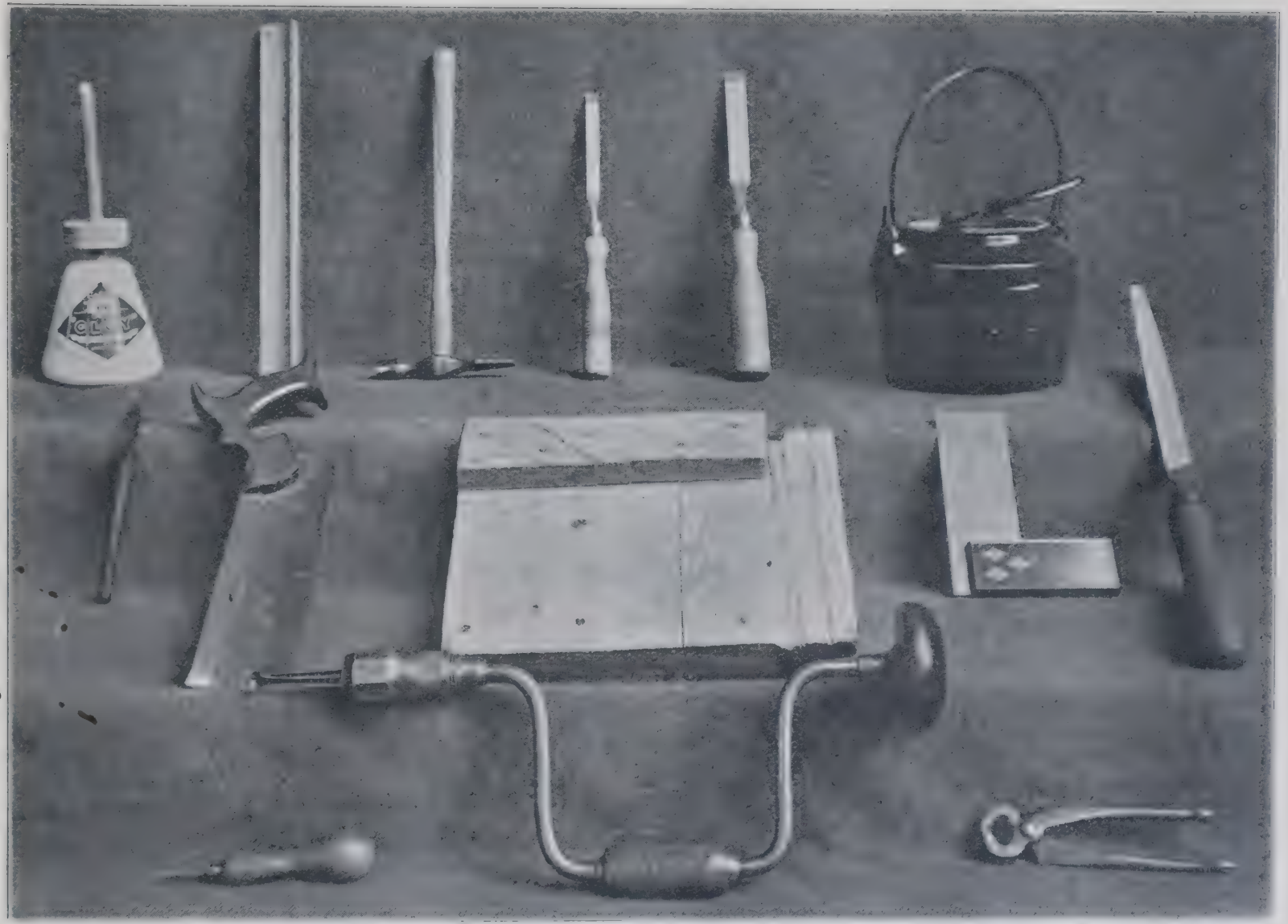


PLATE XLI.—Tools for Modelling.

The tools illustrated have been found sufficient for carrying out all the woodwork and cardboard modelling referred to in this book.

can be used for heating the glue. Care must be taken to keep the pot fairly clean; the glue is in good condition when it runs from the brush in a long connected stream; if it falls in drops it is too thin, and it should never be applied when thick or nearly cold. Many forms of knives for cardboard work are listed; the one illustrated will answer all ordinary purposes; an oilstone should be kept for sharpening tools, and children should always sharpen their own knives.

The saw is an ordinary small tenon saw, with a blade eight inches long, a fairly small handle, and fifteen teeth to the inch. The sawing-board is about ten inches square and made of white wood for cheapness; harder wood is preferable. The square, bradawl, and pincers do not need any comment. The file—a most important tool where planes are not used—is a large flat one, nine inches long; a brace and three or four bits are kept for special work. The chisels, knives, bradawls, files and pincers are kept in wooden boxes made in the class; the sawing boards, placed face to face upright, are conveniently kept in a large wooden box; the saws, squares and hammers will then slip down between the boards, and can thus be kept securely and in good condition. The catalogue prices of most of the special articles mentioned in this book are given below; in the majority of cases a considerable discount is allowed, according to the contract with the firm supplying the goods:—

Gloy, large size, - - - - - - - - - -	1s. a bottle.
Safety straight edges, - - - - - - - - -	6d. each.
Squares, 6-in., - - - - - - - - - -	1s. ,,
Riveter's hammers, - - - - - - - - -	1s. ,,

Chisels,	6d. each.
Glue pots,	1s. ,,
Knives,	4½d. ,,
Tenon saws,	1s. 10d. each.
Sawing-boards,	10d. each.
Squares,	10d. ,,
Flat files,	8d. ,,
Bradawls,	1s. 9d. per doz.
Brace and bits,	3s. 6d.
Pincers,	9d. per pair.
Glass paper,	9d. per quire.
Plasticine,	14s. per stone.
Clay,	1s. 2d. per stone.
Variously coloured Kindergarten pulp paper, in 8-in. packets,	1s. per 100.
Coloured covering papers, 21 ins. × 16 ins.,	4½d. per doz.
Binding strips,	2s. 6d. per 100.
Medium cardboard, 25 ins. × 20 ins,	2s. 6d. per doz.
Passe-partout binding,	6d. per roll.
Glass,	2d. per sq. foot.
Dolls,	¼d. to 6d. each.

All the above-mentioned articles will not be required in order to commence a scheme of handwork. Some excellent constructive work can be accomplished with paper, scissors and paste, with the addition of plasticine or clay as a change in medium. Combined cardboard and wood modelling for boys should be introduced if possible, as the endless variety of objects that can be made, and the numerous ways in which

such modelling can be correlated with other subjects, make it an almost ideal work for the scholars. The introduction of cardboard combined with needlework is by no means a costly matter, because only small remnants are generally required, and again the articles find a ready sale.

XIII.

TIME-TABLES AND TEACHERS' QUALIFICATIONS

In arranging a scheme of constructive work it is important that care should be taken to provide for an adequate amount of handwork to be carried out in connection with the ordinary lessons of the school. It is hardly possible with the present extensive curriculum to introduce handwork throughout the school as a separate subject, but it is possible, and advisable, to supplement the methods of teaching many subjects by the use of suitable constructive exercises.

The work described and illustrated in this book has been carried out under ordinary school conditions with a staff possessing no special qualifications for manual work. Indeed, it is not in the least necessary for teachers desiring to treat constructive work as a "method," to spend their leisure in attending classes for instruction in cardboard, paper, wood modelling, etc. The work taken at such evening classes is often only suitable for children with their supple fingers and immature brain development. The work is apt to create in the teacher's mind an entirely wrong impression of its efficacy and suitability for children. The coming generation of teachers will undoubtedly be trained in constructive

methods from earliest years; they will acquire the necessary knowledge at a fitting period. Handwork for schools is of such a character that the children discover for themselves, by observation and practice, the most suitable and direct method of constructing a certain article, and an ordinary teacher with no previous knowledge of the subject rapidly adjusts himself to the new methods of training.

There does not appear to be any necessity to include constructive work under a special heading in the Time-Table unless a particular branch such as Woodwork, Cookery or Gardening is regarded as a special subject. It is hardly practicable to attempt the carrying out of handwork here and there throughout the lessons; as by the time the necessary apparatus has been given out, there is not much time left in which to do the work; it is of the first importance that a definite, though very elastic, arrangement should be made. The following is a suggested general scheme of correlated handwork, which has proved practical to carry out, and of immense value to the teaching of ordinary school subjects.

First week.—All lessons in arithmetic for the week are to be taken manually, the various cut-out objects are to be pasted in the arithmetic books, with spaces left for sums to be worked afterwards; certain models in cardboard and paper having a direct bearing on the work in hand are to be made, or any other manual work connected with this subject may be done. All geography lessons for the week are to be taken manually, either by free cutting, group work, or plastic work.

Second week.—All history lessons are to be treated manually, either by free cutting or group work; all drawing lessons for the week (other than the ten minutes' daily pen work) are to include, and mainly consist of paper or cardboard, or cardboard and wood modelling.

Third week.—Expression lessons, or writing lessons, are to be done manually by making tableaux in paper and cardboard or plasticine. Needlework lessons are to consist of free doll-dressing and cutting out of material, or needlework combined with the cardboard and paper work prepared in the previous week.

Fourth week.—All writing lessons are to be illustrated with pen sketches during the last ten minutes of the work; and all nature lessons are to be treated manually by the use of plastic material.

Some such arrangement as the above will provide ample facility in every class for handwork, without any detriment, but rather with an enormous gain, to other methods of treating the subject. It will be seen that the two kinds of handwork, *i.e.* the free and the accurate, are provided for.

It should also be noted that the ordinary methods of treating the subjects are in no sense minimised or squeezed out. Many subjects are each treated manually for one week in four, only care is taken that different subjects are so taught during different weeks; by this means the motor and nerve centres are regularly and systematically trained to work in unison. It might perhaps be thought that with work so interesting (as manual application makes it) the effort required is slight; but from observation of children engaged in handwork the conclusion is

forced upon one that the effort made by a child to finish an article, conceived, drawn, constructed, and ornamented by himself, is infinitely greater and longer sustained than the effort which is generally made by a child engaged in any ordinary mental task.

It is important to remember that constructive lessons are pre-eminently scholars' lessons. The teacher with the trained mind and the wide range of experience is naturally an interested guide and director; but the actual work is done by the scholar, and there is little danger that the teacher alone will be mentally active, or that the teacher will lecture and the child apathetically listen.

"The happy mixture of hand and head work must render the occupation supremely pleasant. In the day's work must occur endless delightful difficulties and occasions for skill. . . . Each day there must occur critical moments of supreme struggle and triumph, when struggle and victory must be both invigorating and exquisitely pleasing. . . . Here is occupation: here is excitement: here is struggle and victory: and here is profit" (Thackeray).

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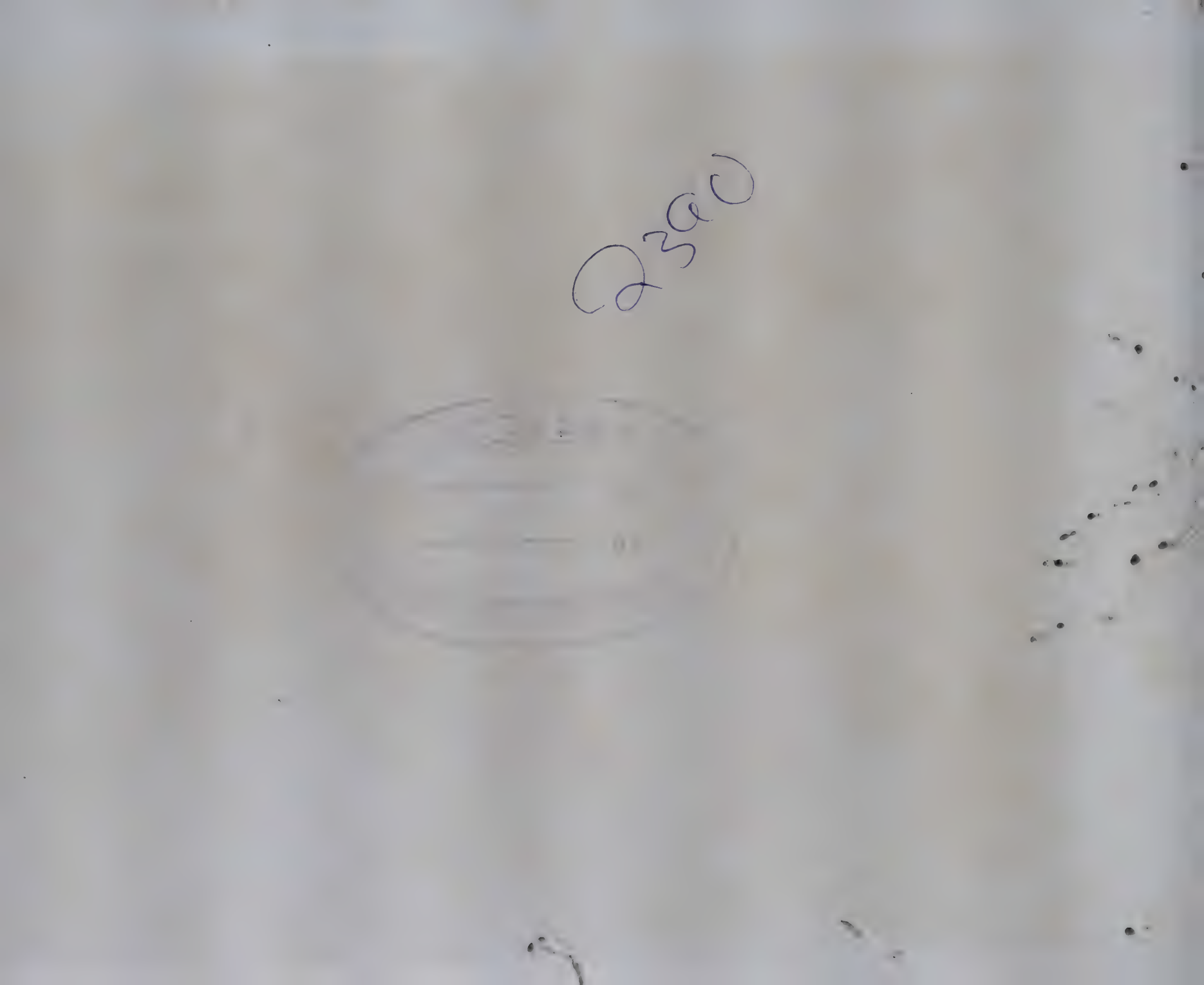

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